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US Investment in Europe

THE migration of US funds to Europe has been very ably examined in two recent articles, one by Mr. John H. Dunning,* Lecturer in Economics of the University of Southampton, and the other by Mr. Brinley Thomas,† Professor of Economics at the University College, Cardiff.

It would seem that by 1958 the US stake in Britain had increased to 47.0 per cent. of all US European investments and just over 57 per cent. of her manufacturing investments. As one of the authors explained, the population of the United Kingdom is about one third of the European Economic Community, and yet it secured about one fifth more of US direct investment. Actually, out of a total of $4,821,000,000 invested in Western Europe in 1959, $2,268,000,000 was located in the United Kingdom and some $1,950,000,000 in the EEC territories. This position is explained by the fact that prior to the formation of the Common Market Britain constituted a convenient bridgehead for marketing in Europe, the sterling area, and the Commonwealth. Recent economic developments on the Continent have altered the position somewhat and persuaded US companies of the desirability of setting up affiliates within the community. The longer Europe remains divided US capital will tend to focus on the Six in order to ensure that US industrialists are in the centre of a rapidly growing market.

West Germany is a particular attraction. Not merely is it a highly liberalized economy, but it is believed to have excellent prospects. The Americans have been amazed at its rapid recovery, strong reserve position, production growth, and aggressive approach to marketing. About 50 per cent. of US investment is located in oil and motor vehicles. Standard and the leading American oil companies are there. Investments include refineries, pipe-line facilities, storage depots, marketing arrangements, and petrochemical installations. In the motor field, Vauxhall, Opel, and Ford-Cologne are leading suppliers. The pattern of US investment follows the normal German trend in that the greater part arises out of ploughed-back profits accrued from earlier years. It is not surprising, therefore, that between 1955 and 1958 US direct investment grew by 65 per cent. compared with 39 per cent. in the United Kingdom. Owing to the West German boom, US portfolio investment has increased substantially in recent years.

In France, about 83 per cent. of US investment is located in oil, metallurgy, and chemicals.

There are several reasons for the expansion of US investment in Europe, and apart from the obvious advantages of improved marketing prospects (comparable with those of the USA now that it has been decided to sweep aside internal tariffs and scale down quotas), which must be regarded as perhaps the primary attraction, other factors have emerged to attract US companies. Favourable cost differentials point to the desirability of locating branches of US industries inside the continental complex. Further, the trend is being encouraged to establish local enterprises rather than to import from abroad and to use Europe as a bridgehead for manufacturing goods for export to the USA itself. One of the authors suggests that over one fifth of the European cars sold in the United States derive from four foreign affiliates of US companies. Some US enterprises envisage the possibility of more substantial earnings in European markets compared with the United States and foresee that Europe will continue to be a leading supplier to many of the emergent countries abroad.

It is worth noting that the earning rate on money invested particularly favours the United Kingdom. Between 1950 and 1958 the net earnings on US direct investment to the UK is estimated at about 17 per cent., followed by a return in Belgium of 13 per cent., Western Germany 12 per cent., Italy 11 per cent., and France 10 per cent.

Many will recollect that when the US investor "discovered" Canada the economy began to surge forward at an immense rate. A scale market was developed, and capital poured in behind it. In recent years something of the same pattern has appeared in Australia. What remains certain, however, is that the US has decided to back the EEC economically as she decided formerly to strengthen Europe politically against Soviet infiltration. Britain, along with six other European countries set on the periphery of the Common Market, would appear for the moment to be standing "off-side." This assembly has not escaped the attention of the foreign investor. Britain and Switzerland remain particularly favoured, but fresh initiative is needed to ensure that the split between the parts does not remain permanent. A suitable accommodation that would commend itself to the interests of all parties con-

* "US Oversea Investment and European Economic Integration," National Provincial Review, April, 1960.
† "Recent Trends in American Investment in Western Europe," The Three Banks Review, September, 1960.

cerned is not an idle possibility, and it would surprise many if within the foreseeable future the two new blocks were not welded into an effective economic union. While public moneys are apt to be slow in appreciating the course of events, private investment is particularly ingenious in spotting opportunity at some distance. Investment in both the Six and the Seven should prove profitable. The only risk is that in the zeal to move in facilities may become duplicated and have to be rationalized should the two points of Europe move together.

Improved Coal Production Imperative

PARALLEL between the American coal industry and that in the UK was drawn last week at the annual meeting of the South Staffordshire and Warwickshire Institute of Mining Engineers by the new president, Mr. J. G. Belfitt, deputy production director (operations) of the West Midlands Divisional Coal Board.

The Americans, he said, had had to compete with oil—as well as natural gas and hydro-electric power—before Britain. Like us, they had lost customers in the process, but the industry rapidly replaced those outlets by supplying increased quantities of fuel for electrical generation. The Americans had met the challenge by improving production and costs and the British coal industry had to do the same if it was to survive.

Within the foreseeable future, Mr. Belfitt said, fully automatic operation of the coal face would be established. There had to be a high standard of coal preparation, a comprehensive service to the consumer, and the price of coal had to be competitive if the industry was to meet the challenge.

Mr. Belfitt succeeded Mr. G. D. Nussey, HM District Inspector of Mines for South Staffordshire, as president and Mr. J. S. Strachan, deputy production manager of the Warwickshire Area, succeeded Mr. C. M. Peel on his resignation as secretary.

Pathologist on Inadequacy of a Pit Helmet

IF the miner had worn a helmet extending further down his neck the injury would probably not have proved fatal, said Dr. David Price, Home Office pathologist, at a Barnsley inquest on a Houghton Main Colliery miner who died after striking his head just below the right ear on a protruding roof support. Death was due to a skull fracture. A verdict of Misadventure was returned on James William Wardell.

Mr. George Clubley, a conveyor belt maintenance man, said that Wardell, who was a filler, was helping to start a conveyor belt which had stopped after a fall of stone. The belt broke as they were trying to start it by hand while the power was on.

Mr. Roy Joblin, deputy in charge of the district, said that he formed the opinion that when the belt broke, Wardell fell back and hit his head against a bar which protruded 6 in. into the belt track and 6 in. from the roof.

North-Western NCB's Chairman to Retire

AFTER 48 years' service to the coal-mining industry, Colonel G. G. H. Bolton, chairman of the North-Western Division Coal Board, is to retire on December 31. His successor will be Mr. James Anderton, deputy chairman of the Scottish Divisional Coal Board, since August, 1958.

COL. G. G. H. BOLTON

Col. Bolton, who has been chairman of the North-Western Division since October, 1951, comes of a family which has been associated with the coal-mining industry for generations. His father was a member of the firm of George Hargreaves & Company, Limited, Accrington and Rossendale, which Col. Bolton joined in 1912. His studies at the Wigan Mining and Technical College were interrupted by the first world war in which he served with distinction. He won the Military Cross in 1916 and later became adjutant of his regiment, the East Lancashire Regiment. He was promoted to colonel in 1920 when he was 25 and was in command of the regiment—part of the Territorial Army—from 1920 to 1928.

Col. Bolton became managing director of George Hargreaves & Company and when the company was merged with Hargreaves Collieries, Limited, in 1952, he was appointed joint managing director. In 1935 he was also appointed executive officer of Lancashire Associated Collieries, Limited. On nationalization he became marketing director of the North-Western Division and its deputy chairman in October, 1949.

His long record of public service in Lancashire has included the Boy Scout movement—he has twice held the position of County Commissioner and has been county president of the North-East Lancashire Boy Scouts' Association for many years. He was awarded the Silver Wolf in 1947 for services of the most exceptional character to the movement.

For more than 20 years he has had an active association with the St. John Ambulance movement, was appointed a Serving Brother of the Order of St. John for the County Palatine in 1933, an Officer Brother in 1948, and a Commander Brother this year. He has been governor of Wigan and District Mining and Technical College since 1952 and is also a governor of Manchester College of Science and Technology.

He was appointed a Deputy Lieutenant of Lancashire in 1935, made MBE in 1946 and CBE in this year's Birthday Honours.

CONFERENCE is to be held by the Federation of British Industries in Brighton from November 24-26 on the subject of "The Next Five Years." Viscount Amory, former Chancellor of the Exchequer will address the 150 leading industrialists attending, after which topics including fiscal and monetary policy, fuel and transport, the problems of economic growth, and oversea credit and investment, will be discussed.

Stainless Steel

31 PER CENT. INCREASE IN PRODUCTION

PRODUCTION of alloy steel in recent months has been increasing faster than that of steel in general, states the Iron and Steel Board in its production report for September. Within the field of alloy steel, production of stainless steel has been growing even faster. Over 75 per cent. of the output of stainless steel is in the flat products such as sheet and strip. For other qualities of alloy steel flat products represent less than 10 per cent., the bulk being in the form of the sectional and bar material used for dropforgings and other engineering components.

The weekly average rate of total production of steel for the January to September period stood at 415,400 tons in 1957. This dropped to 369,800 tons last year, but at the provisional figure of 461,300 tons for the first nine months of this year shows an increase, compared with 1957, of 11 per cent. Of the total production, alloy steel at 24,600 tons in 1957 dropped to 22,600 tons in 1958 and this year is running at the rate of 30,500 tons, an increase of 24 per cent.

The rate for stainless steel in 1957 was 3,600 tons and after a slight drop to 3,200 tons in 1958, has risen to 4,700 tons this year—an increase of 31 per cent., compared with 1957. The board points out that although output of stainless steel represents only 1 per cent. of the total steel output, its importance is underrated since its average value is six times as great as for non-alloy steel.

More Home-produced Pig-iron

In recent months there has been an increasing demand for steel from the investment industries, but this has been partly offset by an easing in the pressure from the industries producing motor-cars and other durable consumer goods. The substantial tonnage of orders on hand makes it likely that steel production will continue for the present at a high level but a sharp reduction in imports is expected, particularly of sheet, since importers have been reducing their commitments abroad.

The increase in steel production this year, compared with 1959, has been derived largely from the greater output of home-produced pig-iron. Home supplies of scrap have also increased but to a lesser extent, with the result that the proportion of scrap in the steelmaking charge is falling.

Weekly average rate of steel production for the third quarter of the year has risen from 366,200 tons last year to 431,000 tons this year. Usage of pig-iron for the same period has risen to 252,600 (203,900) tons.

Coalite & Chemical Expands Research Unit

NEW research centre is to be built at the Bolsover (Derbyshire) plant of Coalite & Chemical Products, Limited. The 10,000-sq. ft. building will house the chemical, chemical engineering, and process investigation sections of the company's research into coal derivatives.

Mr. F. L. Waring, managing director, said that the new centre, fitted with the latest equipment, would be one of the finest examples of its type.

Feminine Touch for Redbourn Coke-oven Lighting

AMID a sea of steel-helmeted officials two ladies, each wearing their own smarter (and softer) hats, lit two new batteries of coke ovens at the Redbourn Works, Scunthorpe, of Richard Thomas & Baldwins, Limited, on Tuesday. They were Mrs. C. G. Davies, wife of the general manager, and Mrs. D. Jenkins, wife of the coke-oven manager. The two batteries which cost £3,500,000, form the first unit to be completed of the works' £23,000,000 development scheme.

The 62 new ovens, which will now take seven weeks warming up before coke production starts, will displace 41 ovens and join the rebuilt Nos. 1 and 2 batteries to produce a maximum of 650,000 tons of coke a year. Of this 580,000 tons a year will feed the enlarged Redbourn blast furnaces.

The £23,000,000 scheme will step up Redbourn's steel production from 10,000 tons a week to 15,000 tons a week by the end of 1961. A new ore preparation and sinter plant—again to feed the blast furnaces—is going up, and a new quarry is to be opened at Winterton for additional ironstone.

The foundations are going in for the Rotor furnace which will first be used for pre-refining iron, to be finished off as steel in the open-hearth furnaces.

Also under construction is the central engineering shop with a seven-storey tower office block. This shop will be one of the most comprehensive of its kind in a steelworks.

"Tragic" to Contract Shipbuilding Industry

RECENT suggestions that the shipbuilding industry in this country should be reduced in size were disputed by Mr. E. J. Hunter, chairman of Swan, Hunter, & Wigham Richardson, Limited, on Wednesday. Such an action, he said, would be a tragedy both for the nation and the people employed in British yards.

It would only mean that when better times returned to shipbuilding not only would it be impossible for British yards to accommodate valuable export orders, but it would not be possible even to supply the needs of British shipowners.

ORGANIZED BY the Sheffield Junior Chamber of Commerce a careers convention is to be held in Sheffield on October 28 and 29.

Passing Thoughts . . .

THERE is an acute shortage of shorthand typists and their salaries are ridiculously high in relation to other skills. This can be overcome by using dictating machines, but there is much resistance to this and similar changes. Strange to relate, I have found that it is not all because of the desire to have a pretty girl around to call a secretary and to fill up the cigarette box, empty the ashtray, and bring in the tea, but because 70 per cent. of executives cannot dictate a letter or write a report. They have never been taught and they are too self-conscious to learn—MR. B. H. DYSON, former general manager of oversea production, Hoover, Limited, speaking at the national conference of the British Institute of Management.

> *The foreman must be thought of as the first rank of management. I believe the engineering industry will have to do as other industries, such as chemical and food have already done, and employ graduates and other men of higher education as foremen.*—MR. T. G. P. ROGERS, *personnel director of Hardy Spicer, Limited, Birmingham.*

It seems clear that no matter how good the technological education may be, it must be accompanied or followed by some specially devised instruction in the use of the English language, if, at management level, technical capacity is not to be largely wasted.—MR. A. R. PERRY, managing director of Senior Staff Consultants, Limited, in a letter to the Financial Times.

> *All industrial disputes about payment are differential disputes . . . Failure to regulate differential payment is one of the fundamental sources of disruption in modern industrial society.* DR. ELLIOTT JAQUES, *social science officer, Glacier Metal Company, Limited, speaking at the national conference of the British Institute of Management.*

Going abroad for orders is a hard life in a very competitive world. The sacrifice which people make in going abroad to sell our goods is worthy of a good deal more sympathy than this or any other Government has given.—MR. ARTHUR TILEY, MP, addressing the annual luncheon of the Engineering Industries Association at Leeds.

> *The main hope for the [shipbuilding] industry lies in its own fully-informed critics rather than in outside ones such as the Department of Scientific and Industrial Research whose unpublished report has had such a cold reception from many shipbuilders.—Glasgow Herald.*

After a year in contact with the coal industry I am convinced that the difficulties facing it are real and substantial. I am confident the industry can overcome them. What it badly needs, and is less likely to get, is sympathy and understanding.—MR. RICHARD WOOD, Minister of Power, speaking at Bridlington.

> *In addition to stimulating efforts to find new uses for small coal, Mr. Robens might usefully test expert allegations that many of the machines now in use are notorious "coal-smashers" which, with true economy, could be replaced.—The Journal, Newcastle-upon-Tyne.*

Two new production buildings, a pattern shop, a maintenance shop, and additional equipment to increase the output of its No. 1 foundry, are included in a £500,000 expansion programme to be carried out by Dartmouth Auto Castings, Limited, Smethwick.

To Direct North-Eastern NCB Industrial Relations

FOLLOWING the retirement for health reasons of Mr. J. V. Curry, Mr. Edwin Keen has been appointed as industrial relations director of the North-Eastern Divisional Coal Board. Mr. Keen joined the labour relations department of the Divisional Coal Board in 1947 and became deputy labour director in 1954.

He began work at the age of 13 at Walton Colliery, near Wakefield (Yorks), and was transferred underground a year later, and spent eight years as a collier and 16 as a checkweigher. He studied mining at Wakefield Technical College and was a member of the Yorkshire Mineworkers' Association, playing a prominent part in union affairs. From 1945 to 1946 he was NUM production officer for the Yorkshire Area. For services to mining he was made a MBE in 1946.

IRON AND COAL has been informed that the death took place on Monday of Mr. Curry, only a few hours after the announcement of his resignation owing to ill-health had been made.

Mr. Joseph Vickers Curry, who was 56, entered the pits at the age of 13 in his native Durham, became the miners' union delegate at Bentley Colliery, near Doncaster, and after serving with the Ministry of Fuel and Power during the war joined the NCB as head of the general branch of the then Labour Relations Department in London, in 1946. In 1953 he was appointed labour director to the North-Eastern Divisional Coal Board, the title of the post being changed to industrial relations director three years later.

Coking Industry Delegation Visits Poland

DELEGATION of senior officials of the coking industry in Great Britain is visiting research institutions and coke-oven plants in Poland. The party is led by Mr. G. W. Lee, director of the British Coke Research Association, and includes Mr. D. E. Baird, director of the British Coking Industry Association, Dr. R. J. Morley, director-general of Carbonization, National Coal Board, and Mr. W. J. Pater of the British Coke Research Association.

A number of coking plants in Poland are being visited and discussions are being held on technical matters of mutual interest. The tour, which lasts for 12 days, is being made at the invitation of the Iron and Steel Board of Poland and is a reciprocal arrangement following the visit of Polish carbonization officials to Britain last December.

NEWPORT'S COAL EXPORTS DROP

DECREASE of 130,000 tons in coal exports for the first nine months of 1960 was reported at a meeting of the Newport harbour commissioners last week. Mr. A. W. R. Evans, NCB marketing officer, said that the decrease from mines controlled by the board totalled nearly 23,000 tons. The difference was accounted for by the small independent mines in the area.

One of the reasons for the decrease in exports, Mr. Evans said, was that much of the coal was being retained for use by local Monmouthshire industries.

DORMAN LONG EXPANSION

Details of £36,000,000 Modernization Plan

PRIMARY aim of the major capital expenditure programme of £60,000,000 since the war, of Dorman, Long & Company, Limited, of Middlesbrough, has been the establishment of advanced techniques at all stages of manufacture in the production of a full range of rolled steel structural sections. The programme included completion in 1958 of the universal beam mill at Lackenby. In addition to the £7,000,000 expenditure announced in July, the company now states that it is to embark on further extensive development, expected to cost £36,000,000.

The chairman of the company, Sir Ellis Hunter, said in London on Wednesday that about half to three-quarters of the £36,000,000 involved would be self-financed, but the company would need additional capital later.

SIR ELLIS HUNTER

The intention is to modernize much of the company's mill facilities for other products. Overall production potential will be increased by a further 400,000 ingot tons per annum. At the same time as improving the efficiency of its plate and semi-finished steel manufacture, the company will substantially increase its capacity in the light product field.

Initial Stages

A feature of the new mill proposals is that they will put the company into a favourable position to embark quickly on wide strip production at the next stage of development. In July, Dorman Long announced plans for building a third 1,500-tons-a-day blast furnace at Clay Lane, and at the Lackenby steel plant a sixth 360-ton steel furnace and a third 600-ton mixer. This work is already in hand and will raise ingot production from the present 2,300,000 tons to 2,600,000 tons. On completion of this stage ingot production potential will be 3,000,000 tons.

The initial part of the programme includes a new primary mill at Lackenby for the production of 22,500 tons of slabs and blooms per week from ingots of up to 20 tons in weight. At Lackenby will be built also a new high capacity universal plate mill to replace the existing universal plate mill at Redcar—the only one in the UK. Universal plate up to 42 in. wide has been a speciality of Dorman Long for more than 40 years and the new installation will give a major advance in the efficiency of production and allow for an increase in width and improved quality.

A new wire rod mill of high capacity to roll coiled bar from ¼-in. diameter down to 5-gauge will be constructed at Lackenby. The existing rod, bar, and narrow strip mill adjoining the Lackenby beam mill will be modified by the provision of additional cooling facilities and extra stands for the production of larger diameter bars (over ¾-in. dia.) in coil and straight lengths. Present facilities for rolling narrow strip up to 12 in. wide at this mill will be retained. Provision will be made for pickling, oiling, and cold rolling of this strip, thus taking the company's products in this developing field to a more highly finished stage.

To provide the increased billet requirements arising from the installation of the new rod mill, it is proposed to add to the semi-continuous billet facilities recently completed at Lackenby.

A start will be made immediately on these earlier projects in the programme coupled with the necessary ancillary services. After completion there should be a steady build-up of rolling rate on these new units, but full outputs will take some time to achieve. Projects in the programme concerned with increasing iron and steel making capacity will be phased in later to coincide with this expansion of new mill requirements as will other mill schemes necessary for efficient overall production.

The Iron and Steel Board has approved in principle the general objectives of the development programme and formally agreed the details of the projects to be implemented in the early phases costing approximately £24,000,0000.

The layout of the new slabbing mill and universal plate mill at Lackenby will be arranged for extension later into a medium width strip mill, possibly 48 in. wide. A combination mill for rolling universal plate and strip is technically attractive. In due course, the company's present mechanized production of sheets will need to be replaced and, therefore, it intends as part of a subsequent major plant development to put forward proposals at the earliest appropriate date to proceed with the addition of hot strip finishing stands to the universal plate mill and appropriate cold rolling facilities.

Basic Materials Price Index Affected by Coal

WHOLESALE prices were mainly stable in September, after declining almost continuously during the first eight months of 1960. The Board of Trade Journal shows that the price index of basic materials and fuel used in manufacturing industry made a slight increase.

The rise of 0.2 per cent. to 100.9 (1954=100) was almost entirely an effect of the increased price of coal. This price increase also affected the wholesale price index of fuel used in manufacturing industry, which rose to 131.0 from 126.4 in August.

Appointments

Richard Sutcliffe's New Mining Manager

FORMER group manager for the National Coal Board, Mr. Peter Whincup took up his new appointment as manager of the mining division of Richard Sutcliffe, Limited, manufacturers of mining machinery and mechanical handling equipment for industry, of Wakefield (Yorks), on Monday.

MR. P. WHINCUP

A Yorkshireman by birth, Mr. Whincup was educated at Boteler Grammar School, Warrington. When he left school, he served an apprenticeship with the Wigan Coal Corporation, Limited, and was assistant manager of the company's Clock Face Colliery when it was nationalized. In 1947 he was made manager of the colliery and he stayed there until 1950 when he transferred to Sutton Manor Colliery as manager. Seven years later he was appointed manager of the No. 2 Group of the St. Helens Area of the North-Western Divisional Coal Board. In 1957-58 Mr. Whincup served as president of the Lancashire branch of the National Association of Colliery Managers.

Mr. CHARLES T. BUSCH has been appointed chief accountant of the Birmingham Small Arms Company, Limited.

Mr. RONALD ELLIS has been appointed assistant general sales and service manager of Leyland Motors, Limited.

Mr. J. E. PALMER has been appointed representative in the south-west of England for Smith & Davis, Limited, brassfounders, of Birmingham, following the retirement of Mr. R. G. Sanders.

Mr. JAMES T. BAILEY, assistant works manager of William Doxford & Sons, Limited, engineers and shipbuilders, of Sunderland, has been appointed to the newly-created post of service manager.

Mr. J. W. DERRICK has been appointed sales representative in South Wales and a number of counties in the south of England for Fry's (London), Limited, tool manufacturers and wholesalers, of Crawley (Sussex). He succeeds Mr. W. Lee Marson.

Mr. W. L. HENDERSON has been promoted manager of the London works of Dowding & Mills, Limited, industrial electrical repair specialists and metal spraying experts, of London, E.9. Mr. P. A. Chambers becomes his assistant and Mr. H. Westwood has been appointed manager of the Birmingham works with Mr. F. J. Gardiner as his asssistant.

Mr. R. G. SMITH has been appointed contracts manager of Nash & Thompson, Limited, engineers, of Tolworth (Surrey). Mr. A. L. LEE has been appointed as sales engineer for the Midlands and Northern England and Mr. D. H. YATES has joined the company as sales office manager. The position of chief inspector has now been filled by Mr. A. WARD.

EAST MIDLANDS CHIEF SURVEYOR RETIRES

AFTER a working lifetime spent in the coal-mining industry, Mr. A. V. Priest, chief surveyor of the No. 5 Area, East Midlands Divisional Coal Board, retired last Friday. He has held the post since vesting day.

Joining the Butterley Company, Limited on January 1, 1911, as a pupil in the survey department, Mr. Priest gained his early experience of coal mining and mine surveying at collieries in the Ripley, Langley, and Kirkby districts. He qualified in 1915, and was appointed as the resident surveyor at Kirkby and Lowmoor collieries. Recalled to the company's head office in 1926, he became the first assistant to the chief surveyor, to which post he was himself appointed in 1942.

An active member of the Institute of Mining Surveyors from its inception in 1919, Mr. Priest was elected president of the East Midlands Branch in 1933. In 1930 he had the distinction of being awarded the institute's first gold medal for the best paper read during the year. In 1954 he became a Fellow of the Royal Institute of Chartered Surveyors, following the merging of the Institute of Mining Surveyors with that body.

For several years Mr. Priest served on the panel of examiners of mining surveyors established under the Coal Mines Act and was also a member of the East Midlands Regional Valuation Board for the purpose of the valuation of Royalties under the Coal Act, 1938.

Government Aid for Exporters

AT the Conservative party conference at Scarborough last Friday, Mr. Selwyn Lloyd, Chancellor of the Exchequer, said that he and Mr. Reginald Maudling, President of the Board of Trade, were considering what practical steps the Government could take to help exports. "We have already taken some decisions, which will be announced shortly," he said, "and, although the primary responsibility for exports must rest with industry, the Government will help so far as it can."

The Home Secretary, Mr. R. A. Butler, told the conference that in the forthcoming session the Government hoped to review and revise arrangements in some of the nationalized industries—starting with the railways and the Post Office. Although still remaining public utilities "we envisage a degree of commercialization, enterprise, and simpler management might be brought into their structure," he said.

D. I. WILLIAMS, LIMITED

RECEIVER for the debenture holder of D. I. Williams, Limited, building, civil engineering, and mining contractors, of Cardiff, has now discharged the debenture, and will shortly be ceasing to act.

It is further stated that the company and the committee of creditors which was appointed on April 26, 1960, have met the receiver to receive a report on his working of the business during the period of the receivership and to consider the future of the company. As a result, it was decided that it was important for the creditors to be consulted. Accordingly, a meeting of the creditors will be held at the South Wales Institute of Engineers, Park Place, Cardiff, on November 7, at 2.30 p.m.

United Steel's Output Record

RISE OF 27 PER CENT. OVER 53 WEEKS

STEEL output of the United Steel Companies, Limited, reached a new record of 3,284,170 tons during the financial year ended September 30, 1960 (53 weeks), which exceeded the previous year's output (52 weeks) by 687,298 tons—an increase of about 27 per cent. Pig-iron production by the group also reached a new high level of 2,008,094 tons, compared with 1,757,413 tons in 1958-59, and new records were also established for iron-ore and coke production.

All the branches of the group broke records—in iron-ore, iron, steel, and coke production. The Appleby-Frodingham Steel Company stepped up pig-iron production (including ferro-alloys) by 102,950 tons to 1,492,580 tons, and its steel by 257,278 tons to 1,384,124 tons. Steel, Peech & Tozer, with a steel output of 1,151,319 tons, was 233,247 tons ahead of the year before, and Samuel Fox & Company, Limited, advanced output by 91,899 tons to 424,487 tons.

Coke production of the group was nearly 200,000 tons up at 1,767,103 tons, and the production of the ore mining branch was 370,787 tons up at 5,456,269 tons. Workington Iron & Steel Company broke records in iron and steel output. Commenting on the figures, United Steel says that "as production continues at a high level, it is now almost certain that the figures for the calendar year 1960 will show a corresponding improvement."

Company's Tenth Birthday

The United Steel Structural Company, Limited, an offshoot of the Appleby-Frodingham Steel Company, Limited, which was registered as a separate company in September, 1950, has now completed its 10th year of operations as such. The company was formed to enable it to compete for structural steelwork contracts of all kinds, as previously it had been limited, as the constructional department of Appleby-Frodingham, to the production of fabricated steelwork for other structural firms, as a sub-contractor.

Since its inception, the company has undertaken many large contracts ranging from schools to power stations, including the radio telescope at Jodrell Bank (Ches). During the 10 years of its existence some 200,000 tons of finished products have been dispatched from the fabricating shops, of which 25 per cent. has been supplied to Appleby-Frodingham, 12½ per cent. to the other members of the United Steel combine, and the remaining 125,000 tons to other customers.

Rise in Exports of Scientific Instruments

THROUGHOUT the year the large increase in the volume of export deliveries of scientific and industrial instruments and apparatus has been consistently higher than that for the home market. Deliveries in the second quarter of 1960 were 5 per cent. up on the corresponding period for 1959.

Total expansion was well spread over the main groups of instruments, but electronic computer deliveries were 42 per cent. less than the high value in the second quarter of 1959.

Effects of Automation on the Older Worker

THE "bogey" of a sudden change to automation in industry existed only in the imagination of newspapers, the British Institute of Management was told at its annual conference in Harrogate last week, by Mr. A. G. B. Owen, chairman of the Rubery Owen & Company, Limited, group, which includes about 50 companies mainly engaged in engineering. Automation, he said was a gradual process and had been accepted for many years in the form of the telephone, the typewriter, and the adding machine.

Mr. Owen, whose subject was "Automation and the Older Worker," said that automation was here to stay, and it was difficult to single out older workers as a special part of the problem to which increasing mechanization gave rise. It was true, however, that the older the worker the more reluctant he was to accept change. Much in automation involved the pressing of buttons and the reading of instruments, all of which could be carried out by older men. It was the management's duty to help him to face the changes involved.

Mr. Owen advocated early promotion for young employees. "I strive to give youth the helm much earlier than most other firms are prepared to do," he said. "At the same time we use the experience of age to try and leaven the exuberance of youth."

The need for a full-scale study of the effects on industry of the Restrictive Trade Practices Act, 1956, was stressed at the conference by Mr. William J. Brown, a London solicitor. Such a study, he said, could be of vital importance, but must involve a detailed knowledge of the industry concerned and not merely the application of economic theory without relevance to the individual facts.

Shipbuilders' Need to Reorganize

SPEAKING at the James Watt dinner held by the Institution of Engineers and Shipbuilders in Scotland last Friday, Sir Nicholas Cayzer, chairman of the British & Commonwealth Shipping Company, Limited, said that from the time of James Watt shipbuilding and engineering had grown up in a rather haphazard way. He wondered if the time was not coming when the regrouping of the various aspects of shipbuilding would have to be reconsidered.

Sir Nicholas said he thought there was a need for specialists in the various branches of the industry. He also felt there was room for more standardization in shipbuilding.

Personal

Manchester Mining Society's New President

SENIOR vice-president of the Manchester Geological and Mining Society, Mr. R. FOSTER, was installed as president on Thursday of last week. He is deputy production manager (planning) of the No. 5 (North Wales) Area of the North Western Divisional Coal Board. For his presidential address Mr. Foster took the theme: "The Role of Consultation in the Mining Industry."

Other officers elected were as follows:—Senior vice-president, Mr. G. W. Sanders; treasurer, Mr. J. Rutter; joint secretaries, Mr. W. J. W. Bourne and Mr. J. C. Fletcher. Mr. Fletcher is the immediate past president. Mr. Sanders is also president of the Lancashire branch of the National Association of Colliery Managers.

Mr. E. HUMPHREY BROWNE, deputy chairman of the National Coal Board, has been appointed a director of the National Industrial Fuel Efficiency Service.

Managing director of McCalls Macalloy, Limited, Mr. C. W. HAMILTON, left last week on a tour of the company's licensees and associates in the US, Australia, and India.

Ald. H. A. BENNIE GRAY, director of W. C. Holmes & Company, Limited, coal by-product manufacturers, of Huddersfield, has received the freedom of the Borough of Huddersfield.

Mr. C. A. S. MOORE, production manager of the Rotherham Area of the North-Eastern Divisional Coal Board, has been re-elected president of the South Yorkshire Mining Society.

Worshipful Company of Feltmakers has installed Mr. J. F. ROY MITCHELL, managing director of Mitchell Engineering, Limited, as its Master. His father is a past master of the Company.

Mr. THOMAS A. MARSHALL, JR., senior assistant secretary of the American Society of Mechanical Engineers, has been elected executive secretary of the American Society for Testing Materials.

Mr. ROBERT ATKINSON, managing director of Wm. Doxford & Son (Engineers), Limited, Sunderland, has been awarded the M. C. James Medal by the North-East Coast Institution of Engineers and Shipbuilders, for his paper on the manufacture of Doxford crankshafts.

Prof. FRANK A. FORWARD, head of the metallurgy department at British Columbia University, has been presented with the John Scott award for contributions to science. The award was made for his discovery of a more efficient way of extracting nickel from ore concentrates.

North-Eastern centre of the Institution of Electrical Engineers has elected Mr. D. H. THOMAS, head of the electrical engineering department of Rutherford College, Newcastle-upon-Tyne, as chairman. Except for three years with the Metropolitan-Vickers, Electrical Company, Limited, he has spent all his working life as a lecturer in electrical engineering.

Mr. JOHN THOMAS RICE, assistant production manager of the No. 3 Area of the East Midlands Divisional Coal Board for the past seven years, has retired. He started his career as a pony driver at Creswell Colliery, later becoming undermanager. In 1937 he was appointed manager of Mansfield Colliery and agent for the Bolsover Colliery Company, Limited.

Mr. EDWARD T. SARA, commercial and economic adviser to the United Steel Companies, Limited, Sheffield, left on Saturday for a three-weeks' visit to the United States. He is studying the influences at work in the increasing industrial activity trend in America which has no corresponding growth in steel consumption and whether this might have relevance to the British steel industry.

Mr. CYRIL CHAMBERS, assistant coal preparation engineer of the No. 5 (Mid-West Durham) Area of the Durham Divisional Coal Board, has retired. He began his career with Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, and after three years as European representative of a engineering company, returned to Sheffield in 1926 and became assistant engineer of Thorncliffe Colliery. He took up his last appointment in 1946.

Former Monmouthshire miner, Mr. J. C. WEBB, is to lead a technical assistance mission to South America this week. While in the mining industry he won a scholarship to Cardiff University where he later joined the research staff. In 1946 he emigrated to Australia and was appointed by the New South Wales Government to organize mining education. He became registrar of the University of New South Wales and later chief engineer to the Australian Atomic Energy Commission.

Mr. W. B. JOHNSTONE, a director of Alexander Stephen & Sons, Limited, has been appointed president of the Clyde Shipbuilders' Association in succession to Mr. John Rannie, shipyard director of John Brown & Company (Clydebank), Limited. Other appointments were as follow:—Senior vice-president, Mr. GEORGE MORRISON, managing director of the Greenock Dockyard Company, Limited; junior vice-president, Mr. GEORGE HILTON, managing director of Scotts' Shipbuilding & Engineering Company, Limited.

At the annual meeting of the British Institute of Management on Wednesday Mr. H. P. BARKER was elected chairman. Mr. Barker joined the board of Measurement, Limited, a subsidiary of Parkinson Cowan, Limited, in 1938, became engineering director and managing director of the parent company shortly after the war, and chairman in 1956. The meeting was also the occasion of the presentation to Mr. JOHN RYAN, vice-chairman of the Metal Box Company, Limited, and also of the BIM, of the scroll of the gold medal of the International Committee for Scientific Management for his outstanding work in the field of international management. Lord BAILLIEU, president of the Dunlop Rubber Company, Limited, and president of the BIM, was presented with the scroll of Honorary Fellowship of the Institute.

Senior Management Changes at United Steel Branches

FOLLOWING the appointment by Tube Investments, Limited, of Mr. G. E. D. Halahan, director and general works manager of the Steel, Peech & Tozer branch of the United Steel Companies, Limited, as director and general manager of the Round Oak Steelworks, Limited, from December 1, 1960, Mr. H. Darnell has been appointed to succeed him at the Steel, Peech & Tozer branch. Mr. Darnell is at present director and general works manager of the Workington Iron & Steel Company branch of United Steel.

Mr. N. D. Macdonald, at present works manager (iron) at the Appleby-Frodingham Steel Company, branch of United Steel, is to be general works manager of Workington Iron & Steel.

Obituary

LORD VERULAM

Chairman of Enfield Rolling Mills

LORD VERULAM, a leading figure in the world of metals and metallurgy and a well-known industrialist, died on Thursday of last week at the age of 50. Chairman of Enfield Rolling Mills, Limited, since 1949, he was also chairman of the Engineering and Lighting Equipment Company, Limited, and Sternol Limited, and a director and member of the London Committee of the District Bank, Limited. He was also a member of the council of the Industrial Welfare Society.

Although he had read zoology at Christ Church, Oxford, Lord Verulam decided very early in his career to apply himself to engineering and metallurgical production. He was appointed managing director of Enfield Zinc Products, Limited, in 1933, a director of Enfield Cables, Limited, in 1936, and its managing director from 1943 onwards. He was a consistent supporter of the Industrial Co-partnership Association but it will be for his outstanding work with the Subsistence Production Society of the Eastern Valleys of Monmouthshire for the five years before the last war that he will long be remembered.

He was a Fellow of the Royal Geographical Society, a Companion of the Institution of Electrical Engineers, and a Fellow of the Institute of Industrial Administration. He is succeeded by his brother, Mr. John Grimston, managing director of Enfield Rolling Mills.

MR. F. E. C. PROBYN

THE death occurred suddenly on Saturday of Mr. F. E. C. Probyn, chief mechanical engineer at the Ebbw Vale Works of Richard Thomas & Baldwins, Limited, since 1958. He was 57.

MR. F. E. C. PROBYN

Mr. Probyn joined Baldwins, Limited, at Panteg, in 1920 and, after five years' apprenticeship in the workshops and seven years in the drawing office, he was appointed assistant steelworks engineer. In 1936 he moved to Richard Thomas & Company, Limited, as engineer on the Wellfield Works, Swansea, and transferred to the South Wales Group in 1937 as assistant engineer, tinplate section. The following year he moved to Ebbw Vale and was placed in charge of hot and cold mills maintenance. Prior to his last appointment he had been deputy chief mechanical engineer since 1952.

Mr. Probyn had served on the engineering committee of the Iron and Steel Institute's iron and steel engineers' group and on the new engineering techniques committee of the British Iron and Steel Research Association's plant engineering division. In the course of his duties he had made several visits to the Continent and America. He was a past president of the Ebbw Vale Metallurgical Society.

MR. R. H. WALKERDINE

WE record with deep regret the death of Mr. Reginald Hubert Walkerdine, editor of the Colliery Guardian. He was 54, and died on October 16 at his home at Danbury (Essex).

Mr. Walkerdine began his association with the coal-mining industry in 1924 at the age of 18 as a student under the late Mr. Walter Preston, then manager of Rufford Colliery. He studied at Nottingham University, securing his B.Sc. degree, and obtained his first-class (manager's) certificate in May, 1930.

For a short time he was employed by the Butterley Company as a research scientist, and was a night overman at Thoresby Colliery before joining the Colliery Guardian in 1931. He was appointed editor of the Colliery Guardian in 1944.

Mr. Walkerdine leaves a widow and three sons.

Mr. ELIJA BOAM, formerly pit deputy at Firbeck Colliery for many years and a well-known trombone player, has died at the age of 69. He was at one time a member of the St. Hilda's band.

The death occurred on Saturday of Mr. WILLIE PARROTT, who retired as a deputy from Wentworth Silkstone Colliery (Yorks) four years ago. He had spent all his working life in the mining industry. Mr. Parrott was 69.

The death has taken place of Mr. JOHN HOWDEN, who before his retirement was general manager and director of Thos. Proctor & Sons, Limited, colliery stores merchants, of Newcastle-upon-Tyne. Mr. Howden was 84.

The death has taken place in Austria of Mr. HARRY JULIUS STONE, a director of H. J. Stone Steel Company, Limited, makers of special purpose and high-speed tool and die steels, of Sheffield. Mr. Stone, who was 56, was on holiday in Austria after a long illness. He had been associated with the steel trade all his business life.

"Coal Industry Must Come Down to Proper Size"

"THERE can be no justification for maintaining an industry at a size greater than its competitive ability justifies," declared Mr. John C. George, Parliamentary Secretary to the Ministry of Power, speaking in Glasgow on Monday. He could see coal becoming a compact, efficient industry attracting the labour it needed by its rewards.

MR. J. C. GEORGE

Referring to the increase in the price of coal, Mr. George pointed out that the industry's deficit amounted to £63,000,000 at the middle of this year. "We could let this deficit go on increasing, for which we would be ridiculed; or ask for subsidies — which would stamp the efforts of 13 years as failure," he said. "Let us compromise by bringing the coal industry down to its proper size."

He said that the Ministry did not believe there was any reason to alter its policy of fair and free competition with full freedom of choice for the consumer. Greater improvements would have to come in the years ahead. "With vast stocks of coal on the ground and with intense competition from oil, raising the price of coal may seem foolish, but recent arbitration awards and rising costs have added heavy new burdens." The outlook for 1960, he said, was that the loss would be at least as heavy as in 1959 and the loss for 1961 might well be higher.

Miners' Union to Issue Three-point Challenge

THREE-POINT challenge was issued by the National Union of Mineworkers at a meeting of the NUM executive in London yesterday (Thursday). It was decided to lodge immediately new pay claims which would add an estimated £20,000,000 a year to the National Coal Board's wages bill.

The NUM is to give warning of its intention to withdraw from the compulsory arbitration agreement with the NCB and is to seek an immediate meeting with Mr. Richard Wood, Minister of Power, to demand changes in the Government's fuel policy.

Mr. Sidney Ford, president of the NUM, said the main reason for the new wage claims was "grave dissatisfaction" with the recent 5s. a week award to day-wage men. The union had decided to seek an 18s. a week increase for day-wage men and a 30s. a week increase for craftsmen.

NEGOTIATIONS WITH Crane, Limited, London, E.C.4, for their companies to become members of the Crane group have been terminated, according to an announcement by R. Blackett Charlton & Company, Limited, and Charlton, Weddle & Company, Limited, the Newcastle-upon-Tyne valve manufacturers and pipework engineers. The proposed merger will not now take place.

Coal Consumption Up by 5,000,000 Tons

WITH two months of the year to go, coal consumption is nearly 5,000,000 tons up on last year's figure. The electricity undertaking has used 37,092,000 tons so far this year, compared with 33,743,000 tons in the first 40 weeks of 1959. The coke ovens have taken over 2,000,000 tons more coal this year and consumption to date stands at 21,738,000 tons. The gas industry and the railways have used less coal this year, but industry as a whole is just about maintaining last year's level of consumption.

There were 587,700 wage-earners on colliery books on October 8, against 643,800 on October 10, 1959, the numbers engaged at the coal face being 222,500 and 249,200 respectively. Total absenteeism (all workers) in the week ended October 8 was 14.78 per cent. compared with 14.99 per cent. in the week ended October 10, 1959. Output at the face was 4.039 tons and overall 1.413 in the week ended October 8, compared with 3.813 and 1.363 tons in the week ended October 10.

The following table gives (in tons) the output of saleable mined coal by division in the week ended October 15, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended October 15, 1960.		Week ended October 17, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	359,100	2,800	382,700
Northern (N & C) ..	248,200	—	258,400
Durham	469,200	200	470,500
North-Eastern ..	816,800	16,100	852,400
North-Western ..	268,500	1,400	276,900
East Midlands ..	899,500	100	903,400
West Midlands ..	276,000	300	305,000
South-Western ..	388,200	1,800	405,000
South-Eastern ..	30,700	—	32,000
Great Britain—			
Deep-mined coal ..	3,756,200	22,700	3,886,300
Other deep-mined (including licensed mines) ..	39,200	—	60,900
Open-cast coal ..	120,900	—	205,700
TOTAL	3,916,300	22,700	4,152,900

FOSECO Changes Company Names

IN view of the group's expansion of interests and activities beyond the foundry industry, particularly to other metallurgical processes, the two principal controlling companies of the Foseco group have announced changes in name. The holding company, Foundry Services Holdings, Limited, and in which the controlling interest is held by Minerals Separation, Limited, becomes Foseco Holdings, Limited, and the managing company, Foundry Services International, Limited, becomes Foseco International, Limited.

The Foseco group includes 16 manufacturing companies marketing over 500 products under various trade names either directly or through distributors covering over 50 countries of the world. These products are principally chemical preparations for improving metal quality, castings yields, and productivity in metallurgical processes from light alloy to steel.

TELEPHONE NUMBER of the Middlesbrough branch of British Insulated Callender's Cables, Limited, is now Middlesbrough 43256.

Tunnelling in Lancashire and North Wales Mines

A REVIEW OF RECENT DEVELOPMENTS

*By W. M. LINKLETTER, B.E., A.M.I.Min.E.**

Great strides have been made in high-speed tunnelling in the Lancashire coalfield in recent years, culminating in the record-breaking advance, in seven days, of 107 yd. 4 in. at Bank Hall Colliery during the week ended December 26, 1959. In this paper, presented to the Lancashire Branch of the National Association of Colliery Managers on January 27, 1960, and to the North Wales Branch on April 1, the author outlines the progress made in high-speed tunnelling in the last 10 years in the North-Western Division of the National Coal Board. The organization of tunnelling operations at Agecroft Colliery are described and details are given of a new drilling pattern, the Coromant cut, which is considered to have many advantages over the "burn" cut.

IN 1949, the first of the big reorganization schemes in the North-Western Division was underway at Bradford Colliery. In addition to pit bottom construction, tunnelling was in progress on the horizons with average speeds over quarterly periods of 15 yd./week and peak advances of 20 yd./week. In 1955, during the Bank Hall Colliery reorganization, average weekly speeds in the Towneley tunnel were 32.5 yd./week over the quarterly periods with a maximum advance of 40 yd. in one week.

In 1956, at Point of Ayr Colliery, average speeds of 22 yd./week over the quarterly periods and a maximum advance of 44 yd. in one week were recorded. The demonstration tunnel at Ashton Moss Colliery averaged 35 yd./week with a maximum advance of 46 yd. in one week during the third quarter of 1958.

Dramatic Increases

During the past year maximum advances in any one week have increased dramatically with 61 yd. (average of 33.6 yd./week over the quarterly periods) being driven in the No. 1 horizon, main north crosscut at Agecroft Colliery. The Rise tunnel at Bank Hall Colliery surpassed this figure with an advance of 66 yd. during the week ended March 28, 1959 (quarterly average advance of 38 yd./week). Agecroft came back strongly with an advance of 81½ yd. in the No. 2 horizon main south crosscut during the week ended June 13, 1959 (quarterly average 38.6 yd./week). This was surpassed again by an advance of 105 yd. 6 in. in seven days in the No. 2 horizon main north crosscut at Agecroft during the week ended August 30, 1959, the average advance for the quarter being 39.8 yd./week. Finally, the record-breaking advance of 107 yd. 4 in. in seven days was achieved in the Towneley tunnel extension at Bank Hall Colliery during the week ended December 26, 1959.

The following information was abstracted from the records of time studies made on the No. 2 horizon main north crosscut at Bradford in 1949 during a week when the advance was 20 yd. The tunnel was supported by 14-ft. to 15-ft. by 10-ft. 6-in. arch girders at 2-ft. centres, lagged with sawn timber between the arches. The gradient was rising at 1 in 515. Six facemen were employed per shift. Rounds of 45 holes using a double-wedge cut for a pull of 6 ft. were drilled by four Holman S.L. 200 machines mounted on airlegs. A model 30 Conway loader, filling into 10-cwt. tubs with a 2-ft. gauge, loaded the broken stone from a central track in the tunnel. Approximately 96 tubs were required to fill out the complete round. A light portable plate was used for switching empties on to the loading track. Transportation was by rope haulage. The tunnel was driven with colliery labour.

The average times for a cycle of operations for an advance of 6 ft. were:—Drilling, 126 min.; charging and firing, 80 min.; loading, 230 min.; arch setting and lagging (three arches), 196 min., giving a total of 632 min. The output per face manshift was 4 cu. yd.

Bank Hall Details

During the week in which the Rise tunnel at Bank Hall Colliery was advanced 66 yd. in five days, the supports consisted of 20-ft. by 12-ft. arch girders at 4-ft. centres with timber lagging. The excavation area was 27.73 sq. yd. Gradient was

* Tunnelling and shaft sinking engineer, North-Western Divisional Coal Board.

rising at 1 in 200. Six facemen were employed per shift. Rounds of 40 holes using the "burn" cut for a pull of 8 ft. 6 in. were drilled by six Holman Silver Three machines mounted on airlegs. Loading was by means of a Distington 50B loader (similar to the American Goodman-Conway), gauge 3 ft. 6 in., filling into 180-cu. ft. mine cars. Approximately 22 mine cars were required to fill out a complete round. Car changing was carried out by a 54-h.p. battery locomotive. The tunnel was driven by colliery labour.

The average time for a cycle of operations for an advance of 8 ft. 6 in. consisted of:—Drilling, 59 min.; charging and firing, 39 min.; loading, 76 min.; arch setting and lagging, 62 min.; laying temporary and permanent track, 20 min.; stoppages, etc., 23 min., giving a total time of 279 min. The output per face manshift was 20.3 cu. yd.

The No. 2 horizon main south crosscut at Agecroft, which was advanced 78 yd. in 15 shifts and 81½ yd. in 16 was supported by 15-ft. to 16-ft. by 13-ft. arch girders set at 3-ft. centres and lagged with fire-resistant timber. The gradient was rising at 1 in 350. Nine face men were employed per shift. Rounds of 60 holes using the "burn" cut for a pull of 8 ft. 6 in. were drilled by eight Atlas Copco BBD 41 airleg-mounted machines. Loading was by means of two Model 21 Eimco Rocker-shovels filling into 62-cu. ft. capacity mine cars, with a gauge of 2 ft. 6 in. Approximately 70 cars were required to fill out a complete round. Car changing was by means of a traverser, superimposed on light section prefabricated track. Transportation was by battery locomotive. The tunnel was driven by the Associated Tunnelling Company, Limited. The average times for a cycle of operations for an advance of 8 ft. 6 in. were:—Drilling, 45 min.; charging and firing, 48 min.; loading, 90 min.; arch setting and lagging, 78 min., with a total time of 261 min. The output per face manshift was 13.2 cu. yd.

Using similar equipment and with a similar number of men per shift, the main north crosscut No. 2 horizon at Agecroft was advanced 105 yd. 6 in. in seven days during the week ended August 30, 1959. The strata consisted of shales and sandstones. The "burn" cut with 45 holes, pulling 8 ft. 6 in., was employed in shale and the wedge cut with 62 holes pulling 7 ft. in sandstone. Average charge per hole was 2.8 lb. Polar Ajax. Standard milli-second detonators with alkathene sheathed leads were used throughout. Forty cycles with an average pull of 7 ft. 10½ in. per cycle were completed in the week. The tunnel was driven by the Associated Tunnelling Company. Average cycle times were as follow:—

(*a*) *Burn cut in shale:*

	min.
Drilling	45
Charging and firing	51
Loading	90
Arch setting and lagging	74
Total cycle	260

(*b*) *Wedge cut in sandstone:*

	min.
Drilling	62
Charging and firing	50
Loading	78
Arch setting and lagging	55
Total cycle	245

Output per face manshift was 13.6 cu. yd.

The Towneley extension tunnel at Bank Hall Colliery was advanced 107 yd. 4 in. in seven days during the week ending December 20, 1959. The tunnel, which was driven through shale and sandstone at a rising gradient of 1 in 200, was supported by 16-ft. 9-in. by 11-ft. arch girders at 3-ft. centres lined with pyrolith treated timber. The excavated area was 21.5 sq. yd.

Face crews consisted of six men per shift, four shifts per day. Drilling was done by Holman Silver Three rock drills mounted on airlegs. Six machines were used for boring the round. The "burn" cut with 39 holes pulling 7 ft. 10 in. was used together with milli-second detonators with alkathene sheathed leads. Loading was done from a central track in the tunnel by a Model 50B Distington tunneller into 180-cu. ft. mine cars. Car changing was by battery locomotive and arch setting was done in the conventional manner, lagging being carried out at the face. Forty-one cycles with an average pull of 2.61 yd. were completed in the week. The tunnel was driven by colliery labour.

Average cycle times, based on 16 complete rounds, were as follow:—Drilling, 47.4 min.; charging and firing, 46.2 min.; loading, 110.8 min.; arch setting and lagging, 38.0 min.; stoppages and breakdowns, 3.0 min., giving a total time of 245.4 min. The output per face manshift was 13.7 cu. yd.

Factors Attributed to High-speed Drivage

Equipment common to all these drivages consisted of airleg-mounted boring machines and wheel-mounted shovel loaders, either Eimcos, Conways, or Distingtons. The big improvement in average and peak weekly tunnelling rates over the past 10 years is attributable to the following factors:—

(1) Technical improvements in the tunnelling equipment and improved services such as higher air pressures, greater density of drilling machines at the face, use of larger mine cars, and improved drilling patterns.

(2) Appointment of Area tunnelling engineers.

(3) Application of work study to tunnelling methods and improved organization and administration of colliery services to the tunnel face.

(4) Establishment of a national demonstration tunnel, the site chosen being in the North-Western Division at Ashton Moss Colliery.

(5) Training and increased skill of labour in tunnelling techniques.

(6) Relaxation of certain mining regulations.

The Coal Measures of Lancashire contain no Pennant sandstone or whinstone, and, in fact, very little rock which is difficult to drill or which might require the use of drifters. For this reason light-

weight drilling machines of the 50-lb. class mounted on airlegs are almost invariably used.

Technical Improvements in Drilling Machines

In the examples of fast weekly drivages previously mentioned it will be noted that either Atlas Copco or Holman rock drills were used. Improvements have been made by both companies in their products. Atlas Copco made a big improvement in drilling with the introduction of their model RH 754 drill, first used in Lancashire in driving the Bank Hall Towneley tunnel. In this model the piston bore was increased from 2½ in. to 3 in., the stroke reduced from 2¼ in. to 1¾ in., and the rate of impact increased from 2,000 to 2,800 blows/min. The net result was an increase in drilling speed, as a clean cut of the strata resulted from each revolution of the drill, and the tendency of the earlier models to bury the drilling rod in the cuttings was eliminated.

Further improvements were made in the later model BBD/41, used at Agecroft, which was designed to eliminate the grease gun lubrication of the RH 754 model. The impact rate of the BBD/41 was increased from 2,800 to 3,000 blows/min. Normal drilling performances of this model are 24 in./min. in shale and 15 in./min. in sandstone. Airlegs have been improved by the use of plastic piston rings and sealings, resulting in constant feed pressure and constant thrust on the drill. An improved control valve has also been fitted. Drill rods of the well-known Coromant steels have been improved by the use of alloy steels and by a manufacturing process and treatment which prevents rusting. This is important as a larger water hole diameter may be used.

Drilling

In addition to benefits resulting from technical improvements in the rock drill and the use of higher air pressures and greater density of drills at the tunnel face, the time taken for the drilling operation has been further reduced by better maintenance of the equipment coupled with the use of a suitable emulsifying oil to prevent rusting of the internal parts of the drill. Standard practice for fast tunnelling in a 15-ft. to 16-ft. by 13-ft. tunnel is to drill with six machines, four on the floor of the tunnel and two on the boring stage. It is customary to have two or three spare machines for replacement in the event of a breakdown. Daily replacement of drill steels with new or reconditioned steels eliminates lost time due to breakages. With a large number of drilling machines the use of two air and two water manifolds has proved an advantage.

The volume of compressed air required is 1,000 cu. ft./min. at a minimum pressure of 85 lb./sq. in. at the tunnel face. The pressure of the colliery supply is generally less than this. If there is no compressed air at the colliery or if the capacity of the existing plant is fully used it is desirable to install inbye compressors to provide the volume and pressure required for the tunnel. One of the main precautions to observe is to site inbye compressors where they can be adequately cooled. If there is spare capacity in the surface compressor plant, booster compressors are desirable as less electrical power and less cooling are required.

Drilling Patterns

The popularity of the " burn " cut has increased steadily since it was used in the Towneley tunnel at Bank Hall in 1955. One reason for this is that more machines may be used at the face than for conventional patterns such as the wedge cut, as all holes are parallel and, as a result, less floor space is required per machine. The easement in mining Regulations, increasing the maximum charge per hole from 28 to 48 oz., has reduced the number of holes required for a given length of pull in conventional patterns and has contributed to the use of the " burn " cut. The increased charge per hole ensures, after firing the initial holes, a free face the full depth of the pull for subsequent shots of the round. In addition, the increased charge per hole has permitted longer pulls of 7 ft. 6 in. to 9 ft. Whereas 45 holes were required in a 14-ft. to 15-ft. by 10-ft. 6-in. tunnel in 1949, for a 6-ft. pull, pulls of 7 ft. 6 in. in larger tunnels are now being obtained with the same number or fewer holes. Fig. 1 shows a " burn " cut pattern suitable for shale.

Clay is no longer used as a stemming medium. Sand-filled paper bags or limestone chippings

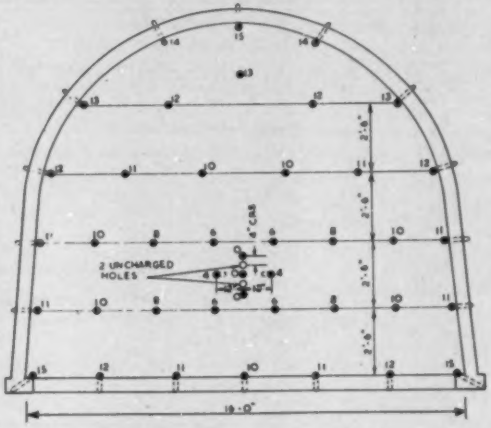
2 UNCHARGED HOLES
19'-0"
DETAILS
No OF HOLES 44
LENGTH OF HOLES 8'-0"
PULL 7'-6"
EXPLOSIVES CONSUMPTION
3 LBS PER HOLE IN BURN, OUTSIDE AND BOTTOM HOLES
2½ LBS PER HOLE IN OTHER HOLES
SHORT DELAY DETONATORS O TO 15

FIG. 1.—ARRANGEMENT OF SHOTHOLES FOR THE " BURN " CUT IN A 15-FT. TO 16-FT. BY 13-FT. ARCHED ROADWAY BEING DRIVEN THROUGH SHALE STRATA.

FIG. 2.—TYPICAL MUCK PILE RESULTING FROM THE "BURN" CUT AND SHORT-DELAY DETONATORS AT AGECROFT COLLIERY.

blown in by Hurricane stemmer do a better job and take less time.

Short Delay Detonators

Milli-second or half-second delay action detonators are now generally used. The advantage of milli-second delays is that an exemption may be granted by the Inspectorate permitting their use through coal seams. With half-second delays their use is discontinued within 5 yd. of any coal seam more than 12 in. thick, and six shot firing substituted. Rhythm and repetition work are thus interfered with resulting in loss of progress. However, half-second firing produces a shorter and more compact muck pile than the long flat pile characteristic of milli-second firing. It is possible to alter the shape of the pile produced by milli-second delays. One method is to arrange the blasting sequence so that, following the cut, a horizontal slot is taken out to the full width of the tunnel using appropriate short delay detonators to give approximately 100 milli-second intervals. Fig. 2 is a photograph of a typical muck pile resulting from the "burn" cut at Agecroft.

Loading

The most popular mechanical loaders in the North-Western Division are shovel loaders, mainly Eimcos, but also including Distingtons. Of all loaders used in major tunnelling schemes, 85 per cent. are Model 21 Eimcos powered by compressed air. Greatly improved loading performances have resulted from increasing air pressures. In fact, a minimum pressure of 85 lb./sq. in. is required for efficient operation of the model 40 Eimco.

Large wheeled loaders, Eimco 40 W's and Distington models 50B and 75, are excellent propositions where the track gauge is 2 ft. 6 in. or more and where mine cars are over 3-ton (coal) capacity. An Eimco 40W, 3-ft. gauge, with wide basket filling into 90-cu. ft. cars, was used in 1958 in the demonstration tunnel when the average quarterly advance was 35 yd./week and the maximum advance was 46 yd. in one week. A model 50B Distington, gauge 3 ft. 6 in., filling into 4½-ton (coal) cars, was used in the Bank Hall Towneley extension tunnel which had a maximum advance of 107 yd. 4 in. in seven days.

Two model 21 Eimcos working side by side are a better proposition than a single loader if the track gauge is 2 ft. 6 in. or less and if the stone is filled into small mine cars or pit tubs. The loading arrangement in the demonstration tunnel in 1957, of two Eimcos, 2-ft. gauge, filling 22-cu. ft. tubs (Fig. 3), produced a quarterly average of 33 yd./week. Finally, two Eimcos side by side were used at Agecroft when the advance of 105 yd. 6 in. in one week was achieved.

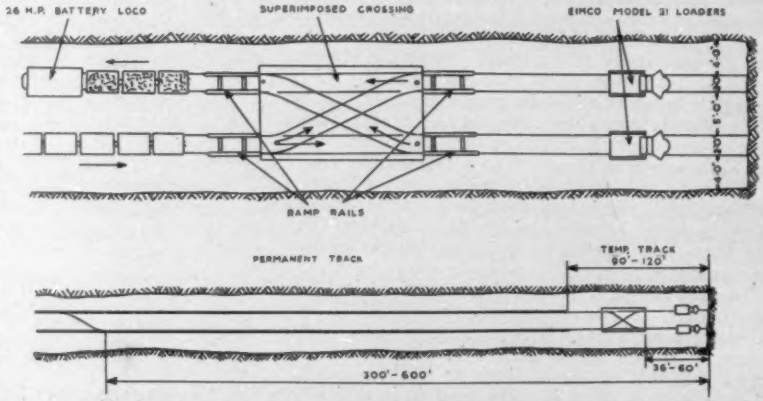

FIG. 3.—LAYOUT OF TRACK FOR LOADING INTO 22-CU. FT. TUBS WITH TWO EIMCO 21 LOADERS.

Car changing behind the loader and advancing track take approximately half the time of the loading operation. There have been gradual improvements in car-changing devices over the past 10 years. In the early days of the Bradford reorganization a Conway shovel loaded into 10-cwt. tubs working on a central track. A second track at the side for bringing supplies and empties to the face was fitted with a portable crossing for switching tubs to the loading track.

But the tunnellers found time was saved by bringing a journey of six tubs on to the loading track, attaching one to the loader and turning the remainder off the track on their sides, replacing them one by one behind the loader as required. Later, where two Eimcos were used side by side, a plate crossing with ramps was superimposed on the tracks, the filled tub being pushed on to the plate by the Eimco and manœuvred by hand on to the correct line. The plate crossing was superseded by the California crossing, and the traverser, and these devices are generally used today.

If small tubs are being filled they may be manually moved over the crossing. But if cars of 1½ tons or more of dirt are being filled they are moved over the crossing by the Eimco loader. As the Eimco has thick wheel flanges the crossing (Fig. 4) must have ample clearances at points and guard rails.

Where a traverser is used (Fig. 5), small pit tubs may be moved from the "empties" to the "fulls" track and pushed off by hand. A photograph of a full tub being moved on the traverser to the "fulls" line is shown in Fig. 6. If large cars are used the filled car on the "empties" side is pushed on to the traverser by the Eimco and moved across to the "fulls" side by hand. The second Eimco on the "fulls" track then pushes its own filled car and the full car on the traverser over the ramps on to the "fulls" line.

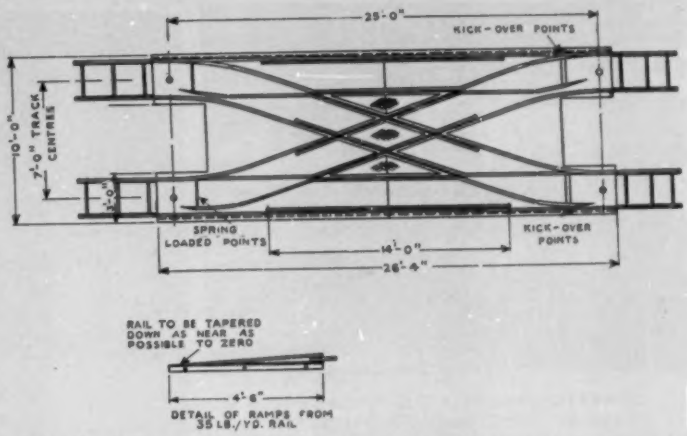

FIG. 4.—DETAILS OF THE PORTABLE DIAMOND CROSSING USED IN THE ASHTON MOSS TUNNEL.

Special consideration was given to the type of crossing used in conjunction with the Eimco 40W at Ashton Moss Colliery (Fig. 7). With this in mind the Eimco was equipped with a ram for propelling the loaded car from the machine to the point of change and a winch to transport an empty car back to the machine. The crossing was designed to facilitate the use of both ram and winch without the possibility of derailment of the full car, and to be of such size and construction as to be light enough to be moved forward freely as the face advanced.

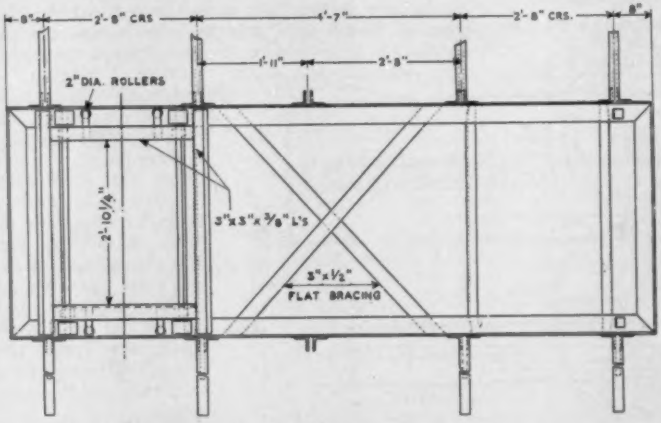

FIG. 5.—CONSTRUCTIONAL DETAILS OF A HAND-OPERATED TRAVERSER FOR USE IN TUNNELS.

Transport between the pit bottom and the traverser or crossing has generally been by locomotive haulage. In high-speed drivage a locomotive at the face during the loading operation is necessary to keep the full cars moving from the crossing or traverser.

Arch Setting

The time required to set and lag a pair of arch girders has been reduced from two hours or more to something like one hour. Arch girders for medium and large sized tunnels are now

FIG. 6.—SWITCHING A FULL TUB TO THE "FULLS" LINE ON A TRAVERSER DURING TUNNELLING OPERATIONS AT AGECROFT COLLIERY.

generally made in three pieces. One advantage of this is that the crown pieces can be placed on horseheads immediately after firing, thus providing greater safety to the loader operators. Another advantage is that the shorter individual pieces of the arch girders can be accommodated in trams in the cages. Whereas two piece arches due to their greater lengths, had in many cases to be slung under the cages for transportation in the shaft.

Management and Organization

The success of any tunnel project, regardless of equipment supplied, the skill of the workmen, or the type of strata is dependent upon proper planning and organization. It is appropriate to say what has been done at Agecroft, where records have been made only to be broken a few months later either in the same or a different tunnel.

The extensive development project was served by

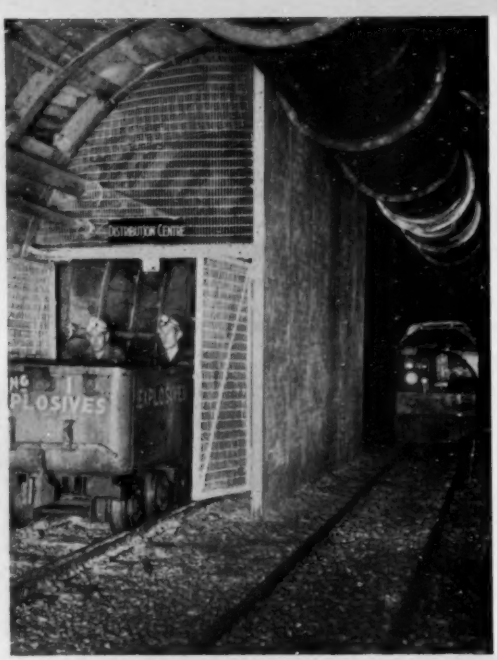

FIG. 8.—EXPLOSIVES STATION IN A TUNNEL AT AGECROFT COLLIERY.

preparing ample stocks of arch girders, slabs, covering timber, and other tunnel supplies in good time before they were required for use. Ordinary supplies were taken down the shaft in the normal manner, but ventilation tubes and large materials over 20 ft. in length were taken down at weekends.

In order to ensure that tunnel supports arrived at the face in the right quantities and at the right times a length of "empties" track was reserved as a stock shunt by strategic placing of left-hand and right-hand crossings. A supply of these crossings is essential in order to move the stock shunt forward at intervals so as to be a suitable distance from the face. The crossings were moved forward at weekends and built into the permanent track, the space they occupied being relaid with rails cut to correct length.

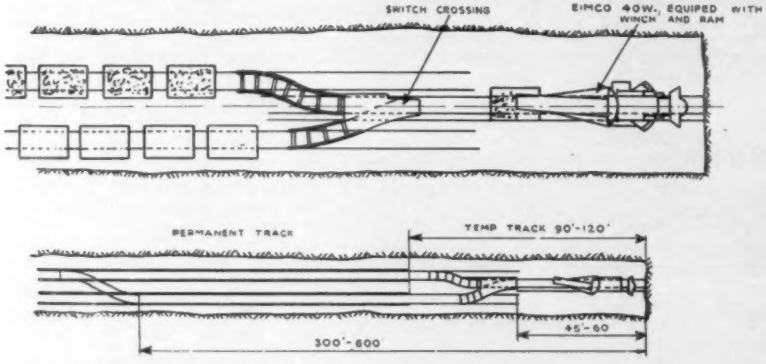

FIG. 7.—TRACK LAYOUT FOR LOADING INTO 90-CU. FT. MINE CARS WITH AN EIMCO 40W LOADER.

The deputy in charge of the tunnel arranged for the locomotive to

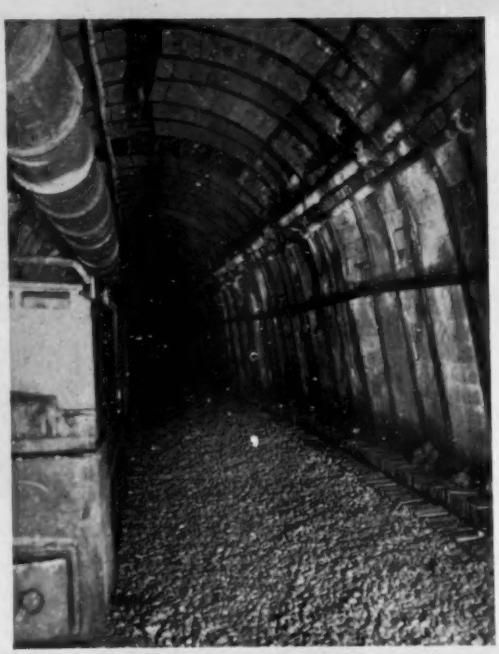

FIG. 9.—TYPICAL LENGTH OF COMPLETED TUNNEL AT AGECROFT COLLIERY.

bring a train of empties into the tunnel while the round was being charged. Experience told him the number required to load out the round. Attached to the empties were cars or trams with arches and covering timber which were available at the face when the round was loaded out.

The problem of delivering sufficient explosives to the tunnel face at the right times for firing five to six rounds of shots, using 900 lb. of powder/24 hr., was solved by building an explosives station on a section of dead track on the empties line in the tunnel. This station accommodated two 700-lb. capacity explosives cars. Canisters of explosives of 10 lb. capacity were carried forward to the tunnel face by the tunnelling crew under supervision of the deputy. This scheme was submitted to and approved by HM Inspector of Mines. Fig. 8 illustrates the arrangement.

The dirt winding capacity at Agecroft during underground development with cage and balance weight in No. 3 shaft was equivalent to 170 yd. of drivage. Fig. 9 shows a length of completed roadway at Agecroft.

Finally, I would like to refer to one of the new developments for improving tunnelling technique. This is a new type of cut called the Coromant cut (Fig. 10), which is being tested by the Sandvik Steel Works Company, Limited, in Sweden. Its purpose is to obtain longer pulls consistently with airleg rock drills. The "burn" cut has given good results in 6-ft. to 7-ft. pulls with uncharged hole or holes of 1¼ in. dia. Longer pulls have been regularly obtained with a single uncharged hole of 3 to 4 in. dia. But the drilling of this size hole is outside the scope of the airleg rock drill.

In the Coromant cut two overlapping holes of 2¼ in. dia. are bored with airleg drills to give a slot roughly 4 in. by 2 in. to which the easer holes can fire. As shown in Fig. 11, a 2-in. dia. steel guide tube with a groove, which the bit can follow when drilling the second hole, is introduced into the first hole and fixed in position by means of an expander.

To achieve the necessary precision when drilling the easer holes a simple drill jig or template is used. Short-delay detonators are used for the easer holes and ½-sec. delays for the rest of the round. Average lengths of pull of 10 ft. per round have been obtained in strong rock with 10-ft. 6-in. holes. Fig.

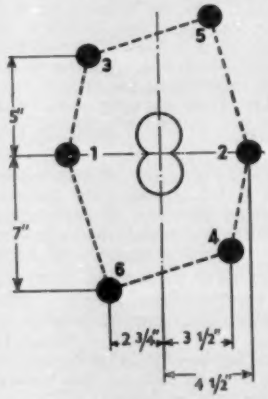

FIG. 10.—DRILLING PATTERN FOR THE COROMANT CUT WITH TWO 2¼-IN. DIA. HOLES. BLASTING HOLES ARE CHARGED WITH 0.17 TO 0.20 LB. OF EXPLOSIVE/FT. OF HOLE.

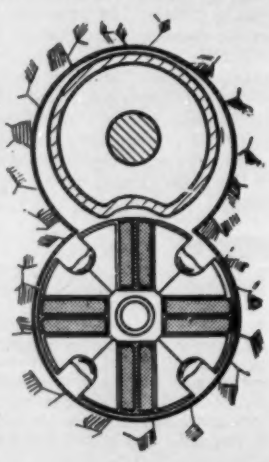

FIG. 11.—DRILLING THE SLOT FOR THE COROMANT CUT.

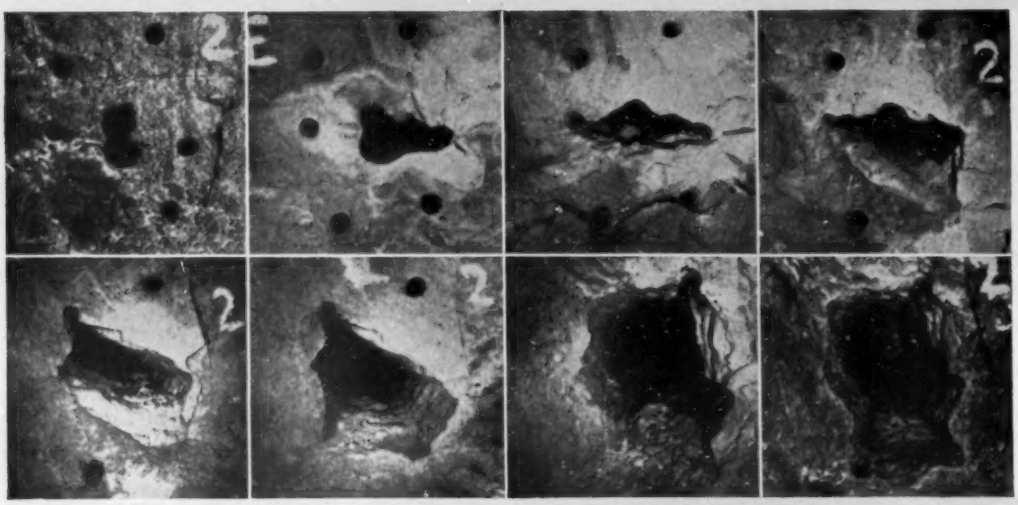

FIG. 12.—BLASTING THE COROMANT CUT WITH TWO 2¼-IN. DIA. HOLES. DEPTH OF HOLES, 10 FT. 6 IN.; ADVANCE, 10 FT. 2 IN.; CHARGING, 0.20 LB. OF EXPLOSIVE/FT. OF HOLE.

12 shows the various stages of enlargement of the slot when firing the easer holes. The slot resulting from drilling the two 2¼-in. dia. holes is more suitable as a free face than one round hole of the same area. Powder consumption for the easer holes is about 0.2 lb./ft. of hole. Advantages claimed for this cut are:—Longer pulls per round are consistently obtained; less consumption of powder per unit volume blasted results; and the pull, being a bigger proportion (95 per cent.) of the drilling depths, less drilling is required per unit advance.

In conclusion, I would like to thank Mr. K. F. Lautman for permission, through the courtesy of Atlas Copco (Gt. Britain), Limited, to reproduce excerpts from his paper on the Coromant cut. I am grateful to Mr. Nutter and No. 1 Area for photographs of Agecroft tunnels and to Mr. McClunie for illustrations of crossings used in demonstration tunnels. Thanks are expressed to Mr. F. G. Glossop, Divisional production director, for permission to give this paper. Opinions expressed in the paper are the author's and not necessarily those of the National Coal Board.

DISCUSSION

Answering a question from MR. H. FOSTER, the AUTHOR said the use of short-delay detonators had not given rise to any problem with regard to misfires.

MR. H. E. TYSON said drilling rigs seemed to have lost favour, and he asked whether the use of a temporary scaffold, which required dismantling and rebuilding, was logical compared with the use of a mobile boom. The AUTHOR replied that drilling booms were still used in other divisions, but the cycle times he had quoted indicated that a scaffold was a satisfactory solution to the problem.

In reply to MR. S. HAY and MR. J. ABBOTT, who asked about the length of drivages achieved, the AUTHOR said the optimum figure of 20 cu. yd. per manshift was very much higher than figures achieved elsewhere in the country, but record drivages could not be expected every time. A more economical and practical average was something over 13 cu. yd. per manshift.

Answering another questioner, the AUTHOR said he did not believe the variations in the number of cu. yd./manshift achieved were the result of working four six-hour shifts instead of three eight-hour shifts.

MICHIGAN'S 1,000th TRACTOR SHOVEL

SALE of its 1,000th British-built tractor, to Sir Robert McAlpine & Sons, Limited, has been celebrated by Michigan (Great Britain), Limited, Camberley (Surrey).

Pioneers in the manufacture of four-wheel drive rubber-tyred equipment, Michigan has designed and produced tractor shovels to match every requirement in all terrain and climatic conditions. The six tractor shovel models in series production in Britain range from 1 cu. yd. to 8 cu. yd. capacity, all models featuring torque converters, power-shift transmission, and planetary drive axles.

In addition to tractor shovels, the company has recently commenced the manufacture of two models of tractor dozers, one of 147 h.p. and the other of 262 h.p., both embodying features of interchangeability of main transmission component parts between tractor shovels and tractor loaders in the same horsepower capacity.

PRODUCTION of bituminous coal and lignite in the US during August, according to the Bureau of Mines, US Department of the Interior, was 36,155,000 net tons, compared with 25,100,000 net tons in the previous month and 30,088,000 net tons in August, 1959.

Extra-deep Drawing Rimming Steel

PRODUCTION BY THE O.L.P. PROCESS

An examination of the quality of extra-deep drawing steel by the O.L.P. process since its inception is made by J. Samson, of USINOR, Montataire, and G. Montlahuc, of USINOR, Denain, in a paper published in Revue de Métallurgie (May, 1960, pp. 387-395). The following is a slightly condensed translation of the paper.

SINCE the end of 1957 many hundreds of casts have been made at Denain using the O.L.P. method and the majority of them have been of dead-soft steel for deep drawing. It was obviously of interest to collect together and analyze information on quality of the steel and compare it with that on open-hearth of the same grade. This has been done under three main headings:—Steel Composition; Mechanical Properties after Hot Rolling; and Mechanical Properties after Cold Rolling.

Steel Composition

The distribution of various elements was examined for a total of 250 casts, each of about 30 metric tons, the analyses being taken on a killed test-ingot of the cast. The averages and the standard deviations for these elements are given in Table I.

TABLE 1.—*Analyses of O.L.P. Casts.*

	Average.	Standard deviation.
C	0.067	0.010
Mn	0.308	0.056
S	0.015	0.005
P	0.022	0.006
Σ (Cu + Ni + Cr + Sn)	0.123	0.029
N_2	0.0015	0.0005

The average analysis of the Thomas iron used was approximately C=3.75 per cent.; Si=0.42 per cent.; Mn=0.86 per cent.; S=0.045 per cent.; P=1.85 per cent.

These results show that the O.L.P. process produces steel with low contents of phosphorus, sulphur, and nitrogen. For the last two elements, in particular, lower contents are achieved than with the open-hearth process. This result explains to some extent why their deep-drawing qualities are equal at least to those of the best open-hearth steels. All the results given refer to rimming steels, for which, therefore, the attainment of a specified analysis on the test ingot is not of itself sufficient to ensure good properties.

The phenomena of segregation, closely related to the effervescence, or boiling action in the ingot mould, are equally predominant in this connection. The first necessity was, therefore, to ensure correct control of this effervescence.

In order to determine the effect of segregation on the final finished product, testpieces were taken on some 60 coils from positions representing the head of the ingot at the axis and side and the base of the ingot at the axis after cropping 15 per cent. and 5 per cent. from head and base, respectively, during slabbing.

Fig. 1 shows the carbon content in the sheet as a function of the carbon content in the ingot. The latter has been taken on the killed test-ingot, while for the sheet the analysis was made on pieces chipped from the whole thickness of the sheet. It can be seen from the graph that the carbon content of the sheet only starts to rise, whatever position it is taken from, in those cases where the ingot carbon is higher than 0.065 per cent.

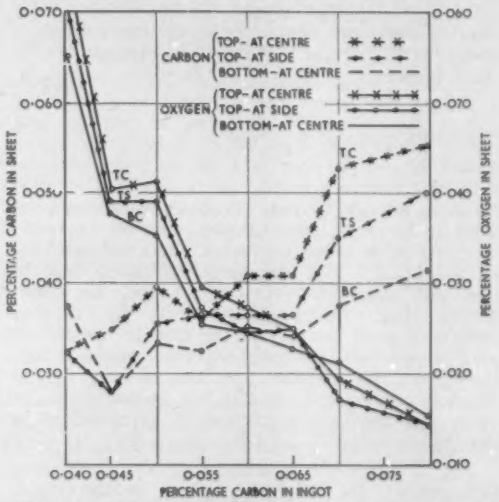

FIG. 1.—GRAPH SHOWING CARBON CONTENT IN THE SHEET AS A FUNCTION OF THE CARBON CONTENT IN THE INGOT.

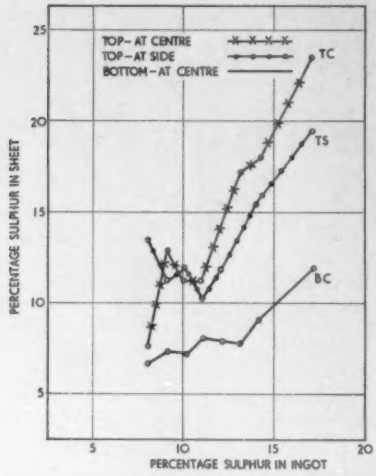

FIG. 2.—GRAPH SHOWING SULPHUR CONTENT IN THE SHEET AS A FUNCTION OF THE SULPHUR CONTENT IN THE INGOT.

Segregation is correspondingly greater as the carbon content in the ingot is higher.

Fig. 1 also gives the oxygen content of the sheets as a function of the carbon contents of the ingots. Previous experience with rimming open-hearth steel has led to it being thought desirable to work to an oxygen content of the order of 0.020 to 0.030 per cent. in the finished product. These contents are found in O.L.P. sheets when the C content of the ingot is between 0.055 and 0.070 per cent. When the carbon content is below 0.055 per cent. the oxygen content in the sheet rises to 0.060 per cent. If the carbon content is above 0.070 per cent. the carbon content of the sheet increases.

Taking the curves for oxygen and carbon together, the indication seems to be that for low carbon values in the ingot, effervescence in the ingot-mould is stopped for lack of carbon, whereas, with high carbon contents, effervescence is stopped through lack of oxygen. With these carbon contents in the ingot, macrographs taken on the heads of slabs have indeed revealed abnormal working of the ingot. This discovery, which is only in line with what was previously known for open-hearth steel, proves the necessity for making certain of good working of the steel in the mould, and, to get this, an optimum value must be obtained for the carbon and the oxygen in the finished product. To attain this objective, it appears that the carbon content to be aimed at in the ingot should be at 0.060 per cent.

Fig. 2 shows the S content of the sheet as a function of the sulphur content in the ingot. The small segregation of sulphur content in the ingot is approximately 0.010 per cent., but segregation increases when the sulphur in the ingot rises and if this latter reaches 0.020 per cent., there is a risk of getting a content of 0.030 per cent. on the centre line of the sheet from the ingot head.

Fig. 3 gives the same curves for phosphorus. The P contents in the ingot vary from 0.010 to 0.030 per cent., and segregation is a little more pronounced in this case, mainly between top and bottom. With a P content of 0.025 per cent. in the ingot there is a risk of getting a value of 0.040 per cent. on the centre line of sheet from the ingot head.

With the conditions of effervescing in the ingot mould adjusted to be approximately the same as those for O.H. steel, it was possible to make the investigation on the basis of the O.L.P. casts being classified simply by their ingot analysis and thus define more clearly the influence of each of the elements on the properties of the sheets, whether hot-rolled or cold-rolled.

Before giving the results obtained on the sheets it is relevant to consider a short résumé of the programme of manufacture.

The extra-mild O.L.P. steel was cast in slab moulds weighing from 7 to 11 metric tons. The ingots were rolled into slabs in the slabbing mill after cropping some 15 per cent. from the top and 5 per cent. from the bottom. They were then rolled in the continuous hot-rolling mill to give sheet blanks in widths between 800 and 1,600 mm. (31½ in. and 63 in.), but mostly of 1,000 mm. (39⅜ in.). The sheet blanks varied between 2 and 3 mm. (0.78 in. to 0.118 in.) in thickness.

From the whole of the casts of dead soft steel under consideration, selection has been made for use in the production of cold deep-drawn sheets of such casts in which the analysis fell

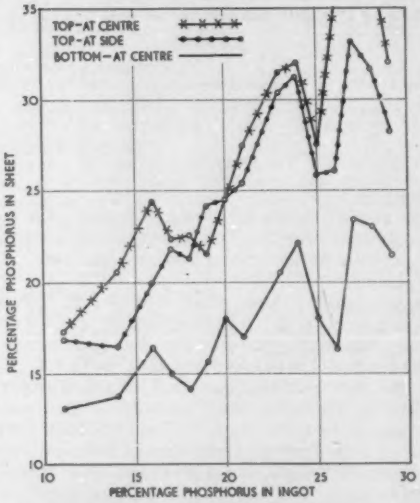

FIG. 3.—GRAPH SHOWING PHOSPHORUS CONTENT IN THE SHEET AS A FUNCTION OF THE PHOSPHORUS CONTENT IN THE INGOT.

between the following limits:—C, 0.045 to 0.080 per cent.; Mn, 0.250 to 0.380 per cent.; S, 0.017 per cent. max.; P. 0.028 per cent. max.; total (Cu + Ni + Cr + Sn), 0.180 per cent. max.

These casts have been rolled both in the continuous hot mill (temperature at end of rolling 850-920 deg. C., coiling temperature 550-650 deg. C.) or in the cold mill and then finished (reduction 55 to 70 per cent.: holding temperature 680 deg. C., time 24 hr.: elongation in skin-pass 0.5 to 1.2 per cent.) under the same conditions as for O.H. steel destined to be used for the same drawing quality.

Mechanical Properties after Hot Rolling

The conditions under which rolling and coiling are done in the continuous hot mill are such that metal can only be taken for mechanical testpieces from the outside of the coil, that is to say from the portion corresponding to the top of the ingot after the 15 per cent. croping. Testpieces were taken from the axis zone and transversely on the sheet. These were UTAC standard testpieces, that is, calibrated length 100 mm. (4 in.); width of calibrated portion 30 mm. (1⅛ in.).

Values of the elastic limit, tensile, and elongation of several hundred coils were examined. The mean and standard deviation values were as in Table 2.

TABLE 2.—*Test Results on Hot-rolled O.L.P. Sheets.*

	Mean.	Standard deviation.
Elastic limit (E)	29.5 kg./sq. mm. (19 tons/sq. in.)	1.9 kg./sq. mm. (1.2 tons/sq. in.)
Tensile (R)	35.3 kg./sq. mm. (22.5 tons/sq. in.)	1.7 kg./sq. mm. (1.08 tons/sq. in.)
Elongation (A)	39.4 per cent.	5.3 per cent.

By way of comparison, on a batch of coils of O.H. steel of similar quality and rolled under the same conditions, the mean values shown in Table 3 have been obtained:—

TABLE 3.—*Test Results on Hot-rolled O.H. Sheets.*

E = 30.8 kg./sq. mm. (19.5 ton/sq. in.)	R = 37.5 kg./sq. mm. (24 ton/sq. in.)	A = 38 per cent.

A histogram of these results showed a very dissymetric spread of elongations, whereas for the elastic limit and the tensile values there was a practically normal spread. This arises from the fact that these last two properties seem to be little affected by the conditions of hot rolling (at least when these can be taken as normal), whereas elongation is extremely sensitive to the temperature at the end of rolling and increases with it. Most of the elongations less than or equal to 36 per cent. come from coils which have finished their rolling at a relatively low temperature, say, below 880 deg. C. On the other hand, the results indicate that if the temperature of the coil during the final passes is above 900 deg. C. the average elongation should be higher than 42 per cent., a figure which cannot be obtained with our present O.H. steels.

Mechanical Properties After Cold Rolling

A portion of the coils hot-rolled at Denain were sent on to Montataire for cold working prior to delivery to customers under marks X and Y. From each coil tensile testpieces were taken from the middle of the coil immediately after the skin-pass.

Particulars have been given above of the limits of analysis decided upon for using coils for deep-drawing quality. The results given below are taken from a total of 152 coils made from more than 100 different casts of which the analysis complied with the above-mentioned limits, the average analysis being as follows:— C = 0.063 per cent., Mn = 0.311 per cent., S = 0.012 per cent., P = 0.019 per cent. Total (Cu + Ni + Cr + Sn) = 0.121 per cent. N_2 = 0.0015 per cent.

The mean and standard deviation values for these coils were as in Table 3.

TABLE 4.—*Test Results on Cold-rolled O.L.P. Sheets.*

	Mean.	Standard deviation.
Elastic limit (E)	18.35 kg./sq. mm. (11.5 tons/sq. in.)	1.66 kg./sq. mm. (1.05 tons/sq. in.)
Tensile (R)	32.35 kg./sq. mm. (20.5 tons/sq. in.)	1.22 kg./sq. mm. (0.85 ton/sq. in.)
Elongation (A)	51.10 per cent.	2.27 per cent.
Rockwell B hardness (HRB)	42.94	3.20

These properties correspond to an excellent quality of deep-drawing steel.

By way of comparison, in the same period with two almost similar qualities, the results shown in Table 5 have been obtained from two lots of rimming O.H. steel.

TABLE 5.—*Test Results on Cold-rolled O.H. Sheets.*

Property.	Mean (1st group).	Mean (2nd group).
E	19.75 kg./sq. mm. (12.5 tons/sq. in.)	18.76 kg./sq. mm. (12 tons/sq. in.)
R	33.68 kg./sq. mm. (21.5 tons/sq. in.)	32.38 kg./sq. mm. (20.5 tons/sq. in.)
A	48.64 per cent.	50.64 per cent.
HRB	47.97	43.91

These two sets of differing production groups correspond to casts with the following average analyses:—

TABLE 6.—*Average Analyses of Rimming Steel Groups.*

Analysis.	1st group.	2nd group.
C	0.061	0.061
Mn	0.284	0.301
S	0.018	0.015
P	0.011	0.006
Total (Cu + Ni + Cr + Sn)	0.220	0.171

It will be noticed that the whole of the O.L.P. casts selected differed essentially from the above in their low S contents and low impurities content (that is, total Cu + Ni + Cr + Sn) and by their higher P contents.

Ageing

The ageing of O.L.P. steel can be assumed, *a priori*, to be less than that of O.H. steel owing to the

fact that its nitrogen content is lower. The final skin-pass, usually carried out cold on sheets, is of great importance to ageing, the harmful effects of which can be described as follows:— Firstly: By a contraction in the range of the elastic limit (with consequent risk of wrinkling during deep drawing; Secondly: By a noticeable alteration in the mechanical characteristics.

Various tests for artificial ageing to try to foretell the tendency towards natural ageing of skin-passed sheets can be visualized.

At the Montataire Works comparisons have been made of the mechanical properties of two tensile testpieces taken from the same sample immediately after skin-passing, one of these being taken immediately and the other after being held for 20 min. at 100 deg. C. The indices for ageing are as follow:—

Elastic limit: e=E after ageing—E normal.
Tensile: r=R after ageing—R normal.
Hardness: h=HRB after ageing—HRB normal.

These indices are nil or negative for a killed steel. With the O.H. rimming steel for deep drawing (1st or 2nd group referred to above) the average was found to be:—

e = +7 kg./sq. mm. (4.5 ton/sq. in.)
r = +0.3 kg./sq. mm. (0.2 ton/sq. in.)
h = +5 HRB

The ageing indices of the O.L.P. coils in terms of mean values were as shown in Table 7.

TABLE 7.—*Ageing Indices of O.L.P. Coils.*

Mean.	Standard deviation.
e = + 4.9 kg./sq. mm. (3.1 tons/sq. in.) ..	2.77 kg./sq. mm. (1.73 tons/sq. in.)
r = + 0.25 kg./sq. mm. (0.16 ton/sq. in.) ..	0.32 kg./sq. mm. (0.20 ton/sq. in.)
h = + 2.98 HRB	1.22 HRB

This steel is definitely less sensitive to ageing than the rimming O.H. for deep-drawing, but the low nitrogen contents have not been sufficient to prevent this ageing, probably owing to the carbon, the phosphorus, and the oxygen. This matter is now being studied. It can, therefore, be seen that with O.L.P. steel, there are great possibilties of obtaining properties which will meet most difficult deep drawing conditions. In fact the promising results from this steel have been fulfilled not only in mechanical tests but also in drawing under the press.

Most of the coils have been sent to the customers in the deep-drawing quality X or in the extra deep-drawing quality Y, most of the work-pieces being painted after deep-drawing, some of them, however, being covered with a coating of vitreous enamel. They are being processed in a perfectly normal manner, and this applies to certain parts of a difficult nature for which generally one is obliged to supply killed steel. In view of its suitability for enamelling, O.L.P. steel might also solve the problem of very difficult deep-drawing jobs which have subsequently to be coated with enamel. The enamelling of killed steel is difficult because "fish scales" are prone to occur.

The results have, then, been excellent, but the mechanical properties can still be further improved. As mentioned above, all the O.L.P. steel has been rolled and treated under the same conditions as the corresponding O.H. steel. From the results obtained it has been possible to draw a number of conclusions which should lead to improvements in the mechanical properties. For instance, it has been shown that, for hot rolled sheets, it is advisable to finish rolling at a temperature above 900 deg. C. in order to get high elongations. A similar study of the results obtained with cold-rolled sheets led to the conclusion that with these, on the contrary, the elastic limit, the tensile, and the hardness are lowered by finishing rolling below 890 deg. C.

This is only one example, but is shows clearly that when more results are available it will be easier to find the optimum working conditions for this steel.

Influence of Chemical Analysis on Mechanical Properties

The whole of the above results show that O.L.P. steel produced so as to give equivalent deep-drawing qualities, enables mechanical properties to be obtained clearly superior to those obtained with O.H. rimming steels of similar grades, and with less alteration in the properties after ageing.

These differences arise from the fact that production of these two types of steel does not result in identical mean values being obtained for each element. If these values are very close for carbon and manganese, this is not the case with the other elements. The phosphorus content of the O.L.P. casts under consideration is higher on the average than that obtained with O.H. steel having good deep-drawing qualities. This difference in phosphorus content does not arise from any inability to get very low values from the O.L.P. process, but rather from the fact that it was not imperative to obtain them and this for the following reason:— It was not necessary to prolong refining for phosphorus to get better properties than could be obtained with O.H. steel sheets. There was thus less risk of over-decarburizing the bath, which would have meant moving away from the optimum carbon-oxygen ratio, to ensure good working in the ingot-mould. On the other hand, O.L.P. steel benefits from the favourable effect of low S and metallic impurities contents, which it is possible to reduce to a very low limit by production from molten Thomas iron treated with oxygen + lime. Finally, another difference, and not the least important of them, is that of the nitrogen content.

During last year an extensive study was made of O.H. steels for deep-drawing made at Denain and this has enabled an appraisal to be made of the influence of the various stages of production (steelmaking, hot-rolling, cold-rolling) on the mechanical properties of the steel. Twenty-

four variables such as analysis, rolling temperature, coiling temperature annealing, thickness, elongation and skin-pass have been studied. For this simple and multiple correlations were calculated on the 704 IBM computer. In this way, among others, a formula had been established relating the Rockweld B hardness of cold rolled sheet to various items of composition.

This formula is as follows:—

$$HRB = A + 57.5\ C + 11.5\ Mn + 160\ S + 410\ P + 35\ (Cu + Ni + Cr + Sn).$$

This formula enables an immediate assessment of the quality of the steel to be made without having to wait for the results of mechanical tests on the cold-rolled sheet, which, in any case, are affected by other than "steelworks" factors.

Investigations were made to see whether this formula, which gives good results for O.H. steel,

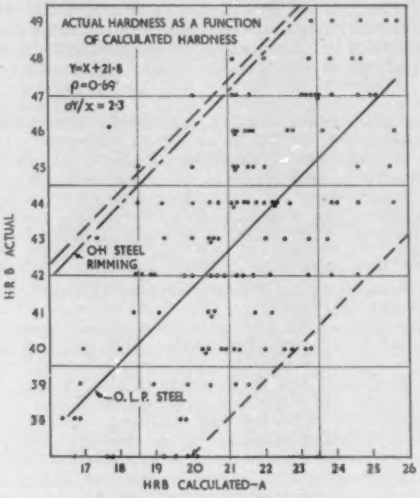

FIG. 4.—GRAPH SHOWING ACTUAL HARDNESS AS A FUNCTION OF CALCULATED HARDNESS.

could be directly applied to O.L.P. steel. Fig. 4 shows points representing each of the cold-rolled coils. The value of the hardness calculated in accordance with the formula, less the constant—*i.e.*, $HRB_c - A$, forms the abscissa and the actual hardness, *i.e.*, HRB_r, form the ordinate. Calculation of regression gives

$$HRB_{actual} = (HRB_{calculated} - A) + 21.8$$

As the angular coefficient of regression is equal to 1, this shows that the formula found for rimming O.H. steel remains applicable in the case of O.L.P. steel, the only difference being that the value of the constant A is not the same.

$A = 21.8$ for O.L.P. steel
$A = 26$ for rimming O.H. steel.

With comparable analyses (C, Mn, S, P, impurities), then, O.L.P. steel has a Rockwell B hardness 4.2 points lower than that of rimming O.H. steel. It can be assumed that this difference comes from the difference in the nitrogen contents, which are O.L.P. 0.0015 per cent. O.H. 0.0055 per cent. That is, for an increase of 0.001 nitrogen, there is a corresponding increase of 1.05 points in the Rockwell B hardness. This relationship seems very likely, in view of the values given in published reports.

The lower sensitivity to ageing of O.L.P. steel is probably also due to the low nitrogen contents. Investigations now in hand will, it is hoped, enable values for the effect of the other elements on ageing to be obtained. On the basis of this formula and taking into account the spread of the classifying analyses, it is possible to determine the outside limits concordant with a quality at least equal, as regards Rockwell B hardness of cold-rolled sheets, to that of good O.H. deep-drawing steel.

Take these first limits, S 0.025 max., P 0.035 max., C 0.08 max.. Mn 0.25 to 0.38, total (Cu+Ni+Cr+Sn) less than 0.180. which would ensure a mean hardness of 47 HRB. For more difficult jobs, and in order to obtain an average hardness of 43 HRB, it would be sufficient to have:—S 0.020 max., P 0.028 max.

It will be seen that the limits of analysis specified above, (S 0.017 max. and P 0.028 max.) were definitely tighter than those actually necessary to ensure these two deep-drawing qualities. Estimations of the possibilities of O.L.P. were on the prudent side and actually these possibilities have shown themselves to be greater than was imagined.

To conclude, O.L.P. steel makes it possible to obtain in hot-rolled sheets, deep-drawing qualities unobtainable with corresponding O.H. steels. In cold-rolled sheets it gives qualities which compare very favourably with the best rimming O.H. steels.

In view of these results it is not too bold to suggest that the quality of O.L.P. steel is not only equal to but surpasses that of the best O.H. steels, particularly in the field of deep-drawing steel.

Health and Safety in Ironfoundries

PRINTED report of the Council of Ironfoundry Associations' Ironfounding Health and Safety Conference, held in April at Blackpool, has been published under the title "Ironfounding Health and Safety." The report, which runs to more than 80 pages, gives the full text of the 10 papers presented, with summaries of the discussions, and of the discussion group reports that formed an important and useful feature of the conference.

The publication amounts to a comprehensive and up-to-date survey of the whole health and safety field. As a review of practical and projected work, and as a symposium of the industry's thinking, it is likely to be a source of reference for a long time.

Copies may be had free on application to the Secretary, Council of Ironfoundry Associations, 14, Pall Mall, London, S.W.1.

New Literature

INCLUDED among the new catalogues, booklets, and other publications which have recently been received are those mentioned below. Readers wishing to obtain a copy of any of the publications referred to should apply direct to the address given, at the same time mentioning IRON AND COAL.

HAYDEN-NILOS, LIMITED, Darnall Road, Sheffield 9—Equipment for pulsed infusion shotfiring and water infusion is described in a new brochure.

FLUIDRIVE ENGINEERING COMPANY, LIMITED, Fluidrive Works, Worton Road, Isleworth (Middx)—Details of the company's services to the oil industry are contained in the October issue of Fluidrive News.

ELECTRICAL APPARATUS COMPANY, LIMITED, St. Albans (Herts)—Details of chairlifts installed by the British Ropeway Engineering Company, Limited, and controlled by E.A.C. equipment are given in illustrated sheet 141.

CRAVEN BROS. (MANCHESTER), LIMITED, Vauxhall Works, Reddish, Stockport—Many examples of the company's equipment are described and illustrated in the September-October issue of the Craven Machine Tool Gazette.

BRITISH TIMKEN, Duston (Northants)—Timken is published monthly and serves all the divisions of the Timken Roller Bearing Company. Of particular interest in the September number is the report, fully illustrated, of the 1960 British Timken Show.

RICHARD THOMAS & BALDWINS, LIMITED, 82, Brook Street, London, W.1—Ingot News maintains its unrivalled reputation as a works newspaper with an October issue containing a description of the company's works at Swindon (Staffs)—"the works in the country."

SOLUS-SCHALL, LIMITED, County Building, Honeypot Lane, Stanmore (Middx)—"Calibration of Ultrasonic Apparatus" and "An Ultrasonic Probe with Variable Angle" are among the articles in the September issue of the SS News, which contains much other material of interest to the technical man.

SAMUEL OSBORN & COMPANY, LIMITED, Clyde Steel Works, P.O. Box No. 1, Sheffield 3—An article on extrusion is the only technical feature of the autumn number of Hand and Heart, the quarterly magazine of the Osborn organization, but the other pages in this attractive publication are filled with interesting news and notes.

BROWN BOVERI & COMPANY, LIMITED, Baden, Switzerland—Some of the installations for which this famous Swiss company is responsible are described in the Brown Boveri Review, published monthly. The magazine also contains many technical articles and other material designed to interest people in heavy engineering.

INSTITUTION OF WORKS MANAGERS, 196, Shaftesbury Avenue, London, W.C.2—"Heating, Ventilating, and Air Conditioning in Industry," by J. E. Greatorex, and "Making Work Attractive," by Winifred Raphael, assistant director of the National Institute of Industrial Psychology, are included in the October number of Works Management (price 2s. 6d.).

BRADLEY & FOSTER, LIMITED, Darlaston Ironworks, Darlaston (Staffs)—"Pig-iron: Some Notes on its Production and Composition" is the main article in the autumn issue of Bradley's Magazine, which emphasizes that, despite all the changes which are taking place in cupola design and operation, pig-iron is still the most important basic material used in the iron-foundry.

ROUND OAK STEEL WORKS, LIMITED, P.O. Box 3, Brierley Hill (Staffs)—Railway enthusiasts will welcome the autumn issue of The Acorn, which contains a pictorial feature on the Pensnett Railway, which, nowadays, is in two units, one serving Baggeridge Colliery and the other functioning as Round Oak Steel Works' principal transporter, linking scrap bays, ancillary factories, and stores to the works.

NATIONAL COAL BOARD, Chancery House, Chancery Lane, London, W.C.2—Month by month, Coal Magazine reflects faithfully the activities of the mining communities in the various NCB divisions. Among the features in the October number is an article by Roy Trueman on Barrow Colliery, where power-loading is paying off in the Swallow Wood Seam with one of the highest o.m.s. figures in the country for a 3-ft. seam.

W. C. HOLMES & COMPANY, LIMITED, Turnbridge, Huddersfield—The problem of preventing dust and raw gas escaping to atmosphere after the discharge of a retort was solved at the Edwinstowe works of the National Carbonizing Company, Limited (where "Rexco" is produced), by the installation of a Holmes-Schneible multi-wash system. The installation is the subject of an article in the autumn number of the Turnbridge News.

ASSOCIATED ELECTRICAL INDUSTRIES (RUGBY), LIMITED, Advertising Department, Mill Road, Rugby.—With a background of more than 25 years' continuous research and development in electronic control systems, the AEI electronic apparatus division is highly experienced in advising and assisting manufacturers desirous of taking advantage of the benefits offered by modern electronic techniques. A synopsis of what has been achieved by the division is given in a new and attractive publication (4051-81, edition A).

COLVILLES, LIMITED, 195, West George Street, Glasgow, C.2—Plant for producing strip steel now building at Ravenscraig and Gartcosh will bring many new techniques to Scotland. "The Plain Man's Guide to the Strip Mill," in the autumn issue of Colvilles Magazine (3d.), tells in simple terms how it will work. The Clyde shipyards are among the company's biggest customers, and Mr. A. H. White, managing director of Lithgows, Limited, contributes an article on their prospects. Other features and articles go to make this a very readable magazine.

An Appeal to Youth

The Scientific Instrument Manufacturers' Association of Great Britain, 20, Queen Anne Street, London, W.1, has published "Careers in the Scientific Instrument Industry," which gives a summary of what a new entrant into the industry can expect to find and what his work and training may be like. The 20-page booklet has 42 photographs showing many types of scientific instruments in action and skilled craftsmen constructing them and also assisting apprentices.

Welding in the Soviet Union

URGENCY IN DEVELOPMENT OF NEW TECHNIQUES

Following a short visit to welding research institutes in the Soviet Union, a party of welding experts from the United Kingdom returned with the impression that emphasis there is placed more on the application of new welding processes, and the associated problems, than on fundamental work for the sake of increasing knowledge. This arises from the all-out drive to expand production and the clear realization of the part played by welding toward that end. The party felt that the importance of welding in the modern engineering and constructional programmes is probably more appreciated in Russia than in this country.

VERY little has been done in this country to date with the friction welding and diffusion welding processes to which Russia is now paying so much attention. The processes appear to offer a number of advantages, however, and the British Welding Research Association is to study their potential applications.

In the friction welding process, employing no external heat, the components to be welded are mounted in a device similar to a lathe, having a rotating headstock and stationary tailstock. The rotating and fixed components are brought into contact by pneumatic or hydraulic pressure when intense local heat is generated. At the moment of upsetting pressure reaches maximum and the drive is automatically stopped. The process can obviously only be used where at least one of the components is a cylindrical or disc-shaped section, but it is claimed that the conversion of electrical energy into motive force is more economic than conversion into heat through a transformer, due to the inductance losses in the transformer secondary circuit; further, the process lends itself readily to mechanization.

The diffusion welding process consists, in essence, of bringing the clean surfaces of the components together in a vacuum, when the application of heat and pressure results in the atoms diffusing at the faying surfaces to produce an alloy. Joints in dissimilar materials, *e.g.*, metal to non-metal, can be produced in this way.

Moscow Welding Exhibition

The visit to Russia took place under the auspices of the USSR State Scientific and Technical Committee and resulted from negotiations carried out by Dr. D. A. Senior, the British Scientific Attaché in Moscow. It was arranged to coincide with the opening of a welding exhibition in Moscow within the permanent Exhibition of the Economic Achievements of the National Economy in the USSR. The party, from the British Welding Research Association, consisted of the director of research (Dr. Richard Weck), the deputy director (Mr. H. F. Tremlett), the assistant director (Dr. A. A. Wells), and the chief metallurgist (Mr. P. T. Houldcroft).

The five principal institutes visited were:—E. O. Paton Arc Welding Institute of the Ukrainian Academy of Sciences, Kiev; A. A. Baikov Institute of Metallurgy, Academy of Sciences, Moscow; VNIIESO Central Research Institute for Electric Welding Equipment, Leningrad; TsNIITMASh Central Research Institute for Plant and Machine Building, Moscow; MVTU Baumann Higher Technical School, Moscow.

The visitors were impressed by the standard set by the exhibition and by some of the exhibits, particularly in the fields of cold-pressure welding (dissimilar metals), friction welding, and diffusion welding. Automation and mechanization of welding processes was the dominant theme. Specific items of interest were:—A portable flash welder with contour transformer to deal with pipes up to 700 mm. in diameter; an automatic twin-head circumferential CO_2 welding machine for the same size of pipe, and a whole range of tungsten arc welders dealing with pipes in a variety of materials and sizes from 10 mm. to 180 mm. dia.

Mass-produced Storage Tanks

Methods to overcome the difficulties of distance and transportation to outlying areas were in evidence, and storage tanks up to 50 ft. dia. were shown which were prefabricated and rolled up for transport to site where the rolls were subsequently pulled open by means of tractors and assembled with the minimum of site welding. Pipelines are dealt with in the same way, being welded in the flat and coiled for despatch. Using a tractor/pneumatic combination, workers expand the 600 m. coils into cylinders on site.

The acceptance standard for finish of welded components is lower than would be the case in this country; puckering on the face of sheet materials when welding on studs, for example, is accepted in the manufacture of car bodies. This, however, is considered of secondary importance to the functional qualities of what is produced.

Although the exhibition was clearly intended to accelerate the spread of the latest techniques into the industries of the Soviet Union, it was significant that even quite senior staff of some of the institutes visited by the British party had not been to the exhibition, nor was it likely

that they would be able to go. This contrasted sharply with the sight of whole families—including small children—visiting the exhibition on Sundays.

Of the five research institutes visited only one was entirely devoted to welding. One of the others was the research laboratory of a factory devoted to the manufacture of arc and resistance welding equipment; another was equivalent to a university department, and in two others welding was a department in an institute which had very much wider terms of reference. In only one of the institutes—the Baikov Institute in Moscow—is most of the research fundamental. In the other institutes, although some fundamental work is carried out, most of the research is directed towards the eventual development of new welding processes, and new processes of manufacture.

While the research and development effort in the Soviet Union in welding technology is on a much bigger scale than it is in this country, this is to be expected from the difference in size between the two countries. There are some quite outstanding achievements, but there are also certain spheres where, owing to the special conditions in the Soviet Union, work is not as far advanced as in this country. Welding of aluminium alloys by the inert gas metal arc welding process appears to be further advanced in this country than in the Soviet Union. But in the Soviet Union the emphasis on submerged arc welding has led to the development of methods and suitable fluxes for the welding of aluminium alloys, titanium alloys, and of copper. The joints appear to be of good quality and are claimed to have properties not very inferior to those of the parent material.

The conditions prevailing in many parts of the Soviet Union are unique, and processes may be developed under the pressure of economic factors different from those existing outside that country. Friction welding, for instance, can sometimes serve as an alternative to resistance flash welding and requires less power. The urge to develop this process came from the possibility of its use in areas of very limited power supply. Another illustration based on difficulties of supply is bare wire welding using steam as the shielding gas, instead of argon or carbon dioxide.

It was apparent that the usual delay between the development of a new process or method and the availability of equipment for industry is extremely short in the Soviet Union. This is probably due to the research workers having excellent facilities at their disposal for the manufacture of prototypes and production machines.

The UK party found the Soviet scientists with whom they came into contact extremely well-informed on the literature of the West, but they greatly welcomed the opportunity of being able to ask questions on points which were not clear to them. They were keen to receive considered critical comments on their papers and expressed the desire to publish such criticism in their own journals.

Coke-oven Gas and Tar Firing of Open-hearths

TWO of the five open-hearth furnaces at ISCOR's Vanderbijlpark steelworks have been converted to coke-oven gas and tar firing and all-basic roof construction. Reporting this, the South African Mining and Engineering Journal (July 22, 1960) states that the conversion has brought about an increase in production from 27 tons to 40 tons per smelting hour, when using the scrap and hot metal process with 60 per cent. hot metal. Previously the furnaces used producer gas as fuel.

The conversion consisted of substituting a suspended basic brick roof for the silica roof previously used, and the installation of a water-cooled burner for admitting atomized tar fuel and coke-oven gas. The air ports were also modified, being so placed in relation to the fuel inlet that maximum turbulence and mixing of the fuel and the air is achieved.

The use of basic brick roof permits higher operating temperatures than with a silica brick roof and, consequently, contributes to the higher production rate now being achieved. Furthermore, greater furnace availability results from the use of the basic brick roof.

Tar, a by-product of the company's coke ovens, is delivered by tank lorries from Pretoria and tank cars from Vanderbijlpark into two 30,000-gal. storage tanks. From storage it is drawn into a circulating system designed to maintain a constant pressure of 125 lb./sq. in. and a temperature of 190 deg. F. Before being fed to the burners, it is heated to atomizing viscosity in thermostatically controlled electrical heaters.

Passing through the burner it is atomized by superheated steam at a temperature of 600 deg. F., and at the same time coke-oven gas, boosted to a pressure of 5 lb./sq. in., is introduced through the burner. Air, pre-heated in the checker-chambers, passes through a slag chamber and enters the furnace through two separate uptakes.

Consumption of tar is approximately 400 gal./hr. and that of coke-oven gas 60,000 cu. ft./hr. Consideration is being given to the use of tar-firing in other furnaces.

THE INCREASE that raised Canadian steel production to an all-time record in 1959 brought an increase in the imports of manganese ore, ferro-manganese, and silico manganese. Ore imports totalled 118,454 short tons, valued at $5,017,112, or $3,294,147 more than in 1958. There was a rise also in domestic despatches of manganese alloys. Exports, however, which consisted of 193 tons of ferro-manganese, were the lowest in a decade.

STONE DUST BARRIERS

FOUR TYPES OF BARRIER APPROVED UNDER NEW REGULATIONS

Under the Coal Mines (Precautions against Inflammable Dust) (Variation) Regulations, 1960, which came into force on October 1, the Minister of Power has approved four types of stone dust barrier. The specification of each barrier and the conditions relating to it are set out below. Approvals Nos. 1 and 2 correspond respectively to the primary and secondary stone dust barriers which have been in use in National Coal Board mines for some years, and Approvals Nos. 3 and 4 are, respectively, primary and secondary barriers modified from a Polish design.

STONE DUST BARRIER APPROVAL NO. 1

Primary Stone Dust Barrier

EACH stone dust barrier shall consist of a number of shelves placed parallel, or as near as may be, to each other along the road. The distance between the nearest parts of adjacent shelves shall be at least 4 ft. 6 in. and shall not exceed 10 ft. 6 in. Each shelf shall rest on brackets rigidly attached to the road supports or sides of the road. No shelf shall exceed 26 in. in width, and the shelf at either end of the barrier shall not exceed 18 in. in width. Each shelf shall consist of a number of dust boards, not exceeding 8 in. in width, spacers, on which the dust boards shall rest, and two cross-members, on which the spacers shall rest. The dust boards and cross-members shall be placed at right angles to the direction of the road and the spacers parallel to it.

No dust board, spacer, or cross-member shall be fastened to each other or any bracket, and each shall, so far as is reasonably practicable, be so constructed and installed that, in the event of any explosion, it may fly without obstruction along the roadway. The two cross-members of a shelf shall be set parallel, or as near as may be, to each other, and their outside edges shall not be more than 12 in. apart.

Conditions

The following conditions shall be complied with:—

(*a*) The manager shall ensure that each barrier in the mine of the type to which this approval relates holds not less than 90 lb. of stone dust per square foot of the average cross-section of the length of road in which it is placed, that no shelf forming part of any such barrier is loaded with more than 700 lb. of stone dust, and that, so far as is reasonably practicable, no stone dust, other than a type which will not cake under the normal atmospheric conditions of the length of road in which it is to be used, is used in connection with any such barrier.

(*b*) The manager shall further ensure that no part of any such shelf and no stone dust thereon is less than 4 in. from the roof or sides of any road or any prop or other support therein.

STONE DUST BARRIER APPROVAL NO. 2

Secondary Stone Dust Barrier

Each stone dust barrier shall consist of a number of shelves placed parallel, or as near as may be, to each other along the road. The distance between the nearest parts of adjacent shelves shall be at least 4 ft. 6 in. and shall not exceed 10 ft. 6 in. Each shelf shall rest on brackets rigidly attached to the road supports or sides of the road. No shelf shall exceed 18 in. in width. Each shelf shall consist of a number of dust boards, not exceeding 8 in. in width, spacers, on which the dust boards shall rest, and two cross-members, on which the spacers shall rest. The dust boards and cross-members shall be placed at right angles to the direction of the road and the spacers parallel to it.

No dust board, spacer, or cross-member shall be fastened to each other or any bracket, and each shall, so far as is reasonably practicable, be so constructed and installed that, in the event of an explosion, it may fly without obstruction along the roadway. The two cross-members of a shelf shall be set parallel, or as near as may be, to each other, and their outside edges shall not be more than 12 in. apart.

Conditions

(*a*) The manager shall ensure that each barrier in the mine of the type to which this approval relates holds not less than 20 lb. of stone dust per square foot of the average cross-section of the length of road in which it is placed, that no shelf forming part of any such barrier is loaded with more than 100 lb. of stone dust, and that, so far as is reasonably practicable, no stone dust, other than a type which will not cake under the normal atmospheric conditions of the length of road in which it is to be used, is used in connection with any such barrier.

(*b*) The manager shall further ensure that no part of any such shelf and no stone dust thereon

is less than 4 in. from the roof or sides of any road or any prop or other support therein.

STONE DUST BARRIER APPROVAL No. 3

Primary Stone Dust Barrier

Each stone dust barrier shall consist of a number of light and heavy shelves placed parallel, or as near as may be, to each other along the road, and in any such barrier the number of light shelves shall not be less than half the number of heavy shelves, and the light shelves shall be placed at each end of the barrier so that there are an equal number at each end. Each shelf, whether light or heavy, shall consist of a number of dust boards, running parallel to the direction of the road, and a frame, on which the dust boards shall rest and which shall run at right angles to that direction.

For the purposes of this approval a "heavy shelf" means a shelf in which the dust boards are at least 14 in., but do not exceed 20 in. in length, and a "light shelf" means a shelf in which the dust boards do not exceed 14 in. in length.

The distance between the nearest parts of adjacent shelves shall, in any case where the adjacent shelves are heavy shelves or a heavy shelf and a light shelf, be at least 4 ft. 6 in. and shall not exceed 6 ft., and in any case where the adjacent shelves are light shelves, be at least 3 ft. and shall not exceed 4 ft. 6 in.

The two main members of each frame shall be at least 6 in. in depth, shall be set parallel, or as near as may be, to each other with their outside edges not more than 8 in. apart, and shall rest on edge on a horizontal bar comprised in a bracket at each side of the road. Each bracket shall be rigidly attached to the road supports or side of the road. Each frame shall be free to slide in the direction of the road. No frame or dust board shall be fastened to each other or to any bracket, and each shall, so far as is reasonably practicable, be so constructed and installed that, in the event of an explosion, it may fly without obstruction along the road.

Conditions

(*a*) The manager shall ensure that each barrier in the mine of the type to which this approval relates holds not less than 80 lb. of stone dust per square foot of the average cross-section of the length of road in which it is placed, that no heavy shelf forming part of any such barrier is loaded with more than 40 lb. and less than 20 lb. of stone dust for each foot of its length, that no light shelf forming part of any such barrier is loaded with more than 20 lb. of stone dust for each foot of its length, and that, so far as is reasonably practicable, no stone dust, other than a type which will not cake under the normal atmospheric conditions of the length of road in which it is to be used, is used in connection with any such barrier.

(*b*) The manager shall further ensure that no part of any such shelf and no stone dust thereon is less than 4 in. from the roof or sides of any road or any prop or other support therein.

STONE DUST BARRIER APPROVAL No. 4

Secondary Stone Dust Barrier

Each stone dust barrier shall consist of a number of shelves placed parallel, or as near as may be, to each other along the road, and each shelf shall consist of a number of dust boards, not exceeding 14 in. in length and running parallel to the direction of the road, and a frame, on which the dust boards shall rest and which shall run at right angles to that direction. The distance between the nearest parts of adjacent shelves shall be at least 3 ft. and shall not exceed 4 ft. 6 in.

The two main members of each frame shall be at least 6 in. in depth, shall be set parallel, or as near as may be, to each other with their outside edges not more than 8 in. apart, and shall rest on edge on a horizontal bar comprised in a bracket at each side of the road. Each bracket shall be rigidly attached to the road supports or side of the road.

Each frame shall be free to slide in the direction of the road. No frame or dust board shall be fastened to each other or to any bracket, and each shall, so far as is reasonably practicable, be so constructed and installed that, in the event of an explosion, it may fly without obstruction along the road.

Conditions

(*a*) The manager shall ensure that each barrier in the mine of the type to which this approval relates holds not less than 20 lb. of stone dust per square foot of the average cross-section of the length of road in which it is placed, that no shelf forming part of any such barrier is loaded with more than 20 lb. of stone dust for each foot of its length, and that, so far as is reasonably practicable, no stone dust, other than a type which will not cake under the normal atmospheric conditions of the length of road in which it is to be used, is used in connection with any such barrier.

(*b*) The manager of every such mine shall further ensure that no part of any such shelf and no stone dust thereon is less than 4 in. from the roof or sides of any road or any prop or other support therein.

Surveys of Ordnance Survey

IN a lecture on "The Large-scale Surveys of the Ordnance Survey" at the West Nottinghamshire Technical College, Mansfield, on October 3, Lt.-Col. D. V. Hutchinson, assistant director in the Field Division of the Ordnance Survey, dealt with the re-survey for the 1/1250 and 1/2500 maps in recent years and the proposed programme for the future. He said that urgent needs in urban areas and coalfields were being dealt with as quickly as possible. The scope and rate of progress was shown on detailed slides. The range of methods was clearly described from chain survey through air survey to tachometry.

Chairman of the meeting was Mr. E. W. Muggleston, past president of the Notts, Derby, and Lincs Branch of the Royal Institution of Chartered Surveyors.

China's Mineral Wealth

SURVEY OF BASIC INDUSTRIES

Coal is China's most valuable mineral asset, both for the present and the future, states K. P. Wang, Far East specialist, US Bureau of Mines, in a paper presented at the 1960 annual meeting of the American Institute of Mining Engineers and published in the August issue of Mining Engineering. Although the accuracy of China's statistics can be questioned, the author says the order of their magnitude is clear. The coal reserves rank among the foremost in the world, along with those of the United States and the Soviet Union.

RECENT exploration has revealed large coal reserves in central, southern, south-western, and north-western China. About 30 large coalfields are said to be in existence; most of the coal is bituminous and seven of these fields have large tonnages of coking coal. The coal industry is being rapidly expanded, output having doubled between 1957 and 1958. Output also rose by another 25 per cent. between 1958 and 1959. Production for 1959 was claimed to be 347,800,000 metric tons, constituting 10 per cent. of the world's production. China thus holds the third place among the world's coal producers, even discounting a maximum of 20 per cent. due to losses in coal cleaning and possible statistical exaggerations.

Despite the large output, there is no surplus of coal. In fact, because of distribution difficulties, shortages may exist on occasions in some areas. Most of the major coal-producing centres are found in areas of industrial development, whereas medium and small mines are developed to meet local needs.

Household heating is still the most important item of coal consumption. However, of the 270,000,000 metric tons reported to have been produced in 1958, about 30 per cent. was used for iron and steel smelting, 12 per cent. for power generation, 6 per cent. for railways, and 5 per cent. for coal mine use. There has been a tendency to disperse coal production as much as possible to avoid distribution bottlenecks due in part to inadequate transport facilities.

Iron and Steel

Discounting exaggerations, the workable reserves or iron ore appear to be capable of supporting a 50,000,000-ton steel industry. Ore quality and type vary greatly, but this poses no special technological difficulties.

Iron ore, like coal, is widely distributed in China; while details on deposit localities are not known, the iron and steel projects now planned imply iron-ore concentrations in many parts of the country. Because of limited steel production in the past, iron ore should remain much more important than scrap for making steel.

Present iron and steel smelting practices for the larger plants compare favourably with European and Japanese standards. The Chinese appear to have mastered the art of building blast furnaces, open-hearth furnaces, converters, and electric furnaces and are starting to manufacture blooming mills and rolling mills. The great importance of large- and medium-scale iron and steel plants has been somewhat obscured by the publicity given to small plants and "backyard" furnaces. The inefficient furnaces are being abandoned and the so-called small plants operated in a fairly systematic manner.

The fully integrated Anshan plant in Manchuria is still the backbone of the iron and steel industry of China. Its tenth and largest blast furnace (about 45,000 cu. ft. with a daily capacity of approximately 2,500 metric tons of pig-iron) and its 23rd, 24th, and 25th open-hearth furnaces (500 to 600 tons per heat) have recently gone into production. This steel plant will be expanded in the near future to about 6,000,000 metric tons of iron and steel products annually.

Two important developments in the smelting practice at Anshan are that much oxygen is now used, and the "stomach" or hearth of the blast furnaces has been enlarged 25 per cent. with good results. Two other major iron and steel plants are in the course of construction. The Wuhan iron and steel centre in central China already has two large blast furnaces (about 40,000 cu. ft.) and three 500-ton open-hearth furnaces in operation. Two other blast furnaces and corresponding open-hearth furnaces are scheduled to be built. The Pao-t'ou iron and steel centre in Inner Mongolia recently blew-in its first large blast furnace as a start to becoming one of the three largest steel plants in China.

Shanghai has gained considerable stature as an iron and steel centre in recent years; its current output of steel and steel products ranks second only to Anshan. About 15 other medium-scale plants and 25 smaller plants are being constructed in various parts of the country.

Ferro-alloys

Before the Communist era, almost all the ferro-alloy minerals produced in the country were exported. With the rapid expansion of the iron and steel industry, however, the overall picture

has changed. China is now making ferro-alloys as well as special steels in electric furnaces. A manganese-ore industry, producing 1,000,000 metric tons annually, is being developed which would be large enough not only to meet internal needs but also allow some for export (*e.g.*, Canada imported nearly 10,000 tons of manganese ore from China in 1958). The Chinese apparently use much more manganese in steelmaking than western practice because of the greater availability of this material.

Chinese tungsten has long been famous in world markets; about 20,000 metric tons of 65 per cent. WO_3 concentrate are produced annually when demand is great and 15,000 tons when demand is slack. Domestic consumption of tungsten may be approaching the level of 5,000 tons per year to meet the rising needs for cutting tools and drill bits. Already a medium-sized producer of molybdenum concentrates, China may become even more important in the future. Present output of molybdenum is primarily exported because of the large supply of tungsten which can be substituted for many of the molybdenum applications. The Chinese now make tungsten and molybdenum metal.

There is no indication that chromium or nickel ore of any consequence is being produced, for rising demands are met by imports. China appears to require 50,000 tons of chromite, partly in the form of equivalent ferro-chrome, and several thousand tons of nickel, mainly as ferro-nickel, annually at present. Refractory chrome needs are being substituted to some extent by domestic magnesia-alumina materials. There is no shortage of most minor ferro-alloy minerals, such as titanium and vanadium.

Manganese resources are extensive, probably of the order of 50,000,000 to 100,000,000 metric tons. Most important high-grade deposits occur south of the Yangtze river, extending from Fukien Province westward through Kiangsi, Hunan, Kwangtung, Kwangsi, and Kweichow provinces. Some important high-grade deposits have also been found in the north.

Tungsten deposits are much better known; in terms of 65 per cent. WO_3 concentrate, the tungsten reserves are about 5,200,000 metric tons. The four big mines—Hsi-hua-shan, Ta-chi-shan, Kwei-mei-shan, and Pan-ku-shan—in Kiangsi Province all produce wolframite. Kwangtung Province, also a producer of wolframite, ranks next to Kiangsi.

Extensive researches of scheelite exist, primarily in Hunan Province. Molybdenum reserves are still rather doubtful, although the Chinese claim the discovery of a very important deposit in the Chin-ling Mountains of Shensi Province. The mine that has furnished most of the country's molybdenum is Yang-chia-chang-tzu, in Manchuria.

A nickel copper deposit with reserves of about 10,000 tons of nickel and 5,000 tons of copper is said to have been found at Li-ma-ho in Yunnan Province, along with several other nickel-cobalt occurrences of doubtful value in various parts of the country. An intensive search for chrome is also being made, but no significant discoveries are claimed.

US Lignite Gasification

SIGNIFICANT step towards the gasification of American lignite—both as a future source of chemicals and as a substitute for natural gas—has been taken by the US Bureau of Mines. A new pressure gasifier being developed by the bureau at its Grand Forks lignite research laboratory is stated to have made several highly satisfactory test runs. The gasifier, a fixed-bed slagging type, operates on char, a partly carbonized lignite. Steam and oxygen react with the char to make producer gas of good quality at high overall efficiencies.

For the first time in the US, members of the bureau's research staff have operated this type of gas generator at temperatures high enough to permit discharging the ash as a liquid slag. Gas generators now in commercial use must discharge ash in solid form and consequently must be operated at temperatures below the melting point of ash to prevent formation of large lumps of fused ash. The experiments will continue for several months. They are required to develop a knowledge of process variables, so that feed and slag-removal sections of the generator may be constructed to withstand much greater pressures for which its shell was designed.

Two further advances must take place before the generator can be considered a prototype for commercial development. It will be tested at pressures ranging from 370 to 450 lb./sq. in., still using lignite char. Then, trials are planned with raw lignite instead of char in the generator, thus eliminating the char-making step. It was found at the Grand Forks laboratory in preliminary low-pressure test runs at 80 lb./sq. in. that operating efficiencies were "appreciably greater" than normally obtained in commercial operation of similar gas generators.

The raw gas generated by the bureau at Grand Forks is much like "water gas" made with ordinary coke and steam all over the world. It contains hydrogen, carbon monoxide, methane, moisture, and carbon dioxide in proportions that vary with pressures, temperatures, and rates of feed. Treatment of this raw gas yields "synthesis gas," a mixture of hydrogen and carbon monoxide, from which many valuable chemicals, as well as synthetic liquid fuels, may be obtained. This gas also may be reacted to produce methane, the principal ingredient of natural gas, a household and industrial fuel in many parts of the US.

TWO STEELMAKING CONFERENCES

Chemistry of Steelmaking

TIMELY discussions on the chemistry of steelmaking, with special emphasis on the modern oxygen-steel processes, took place at a conference of steelmakers at Harrogate, organized by the British Iron and Steel Research Association, on Wednesday and Thursday of last week.

Dr. T. P. Colclough, technical adviser, British Iron and Steel Federation, who opened the conference, referred to the revolution which UK steelmaking practice had recently undergone. The two basic-Bessemer plants of the UK had changed over to oxygen-blowing practice and a large converter plant using the oxygen-steam process had gone into operation at the Abbey works of the Steel Company of Wales, Limited.

Steel expansion plans were heavily weighted in favour of the new processes. At the works of the Consett Iron Company, new plant was being installed for the LD and Kaldo processes and the latter process was under consideration for another works. Colvilles, Limited, was to install an LD converter and Richard Thomas & Baldwins, Limited, was building a Rotor plant at its Redbourn works and at its new integrated works at Llanwern the steel would be produced by the LD process. In addition, many of the open-hearth plants were using oxygen to assist combustion and refine the charge, the Appleby-Frodingham furnace having converted to highly productive "Ajax" furnaces. These big changes were based on the pioneer work of recent years carried out in this country and on the Continent.

Special tribute was due, Dr. Colclough said, to the late Oscar Brandt, whose work in the early prerefining development projects at Brymbo, Skinningrove, Redbourn, and elsewhere had been so successful and had advanced markedly the use of oxygen for steelmaking in this country.

The vice-chairman, Mr. G. E. Speight (Richard Thomas & Baldwins, Limited), who is chairman of the BISRA Physical Chemistry of Steelmaking Committee, presided over the whole of the conference. The papers were:—

"The Practical Chemistry of Oxygen Steelmaking Processes," by R. A. Hacking (Richard Thomas & Baldwins, Limited); "The Theoretical Basis of Oxygen Steelmaking," by Dr. J. Pearson (BISRA); "Recent Developments of the Physical Chemistry of Slag/Metal Processes," by Dr. S. Klemantaski (BISRA); "Practical Factors Influencing the Rate of Slag Formation and Slag/Metal Reactions," by D. Hadfield (Colvilles, Limited); "Experimental and Theoretical Studies of Processes Controlling the Rates of Steelmaking Reactions," by Prof. F. D. Richardson (Department of Metallurgy, Royal School of Mines).

Automation in Steel

MR. W. M. LARKE (Stewarts and Lloyds, Limited) was chairman of the first conference on automation in the iron and steel industry, organized by the British Iron and Steel Research Association and held at Buxton, on Wednesday of last week. In his opening address, Lord Halsbury, president of the Operational Research Society, examined briefly four types of operations under the heading "automation"—transfer machining, assembling and packaging, batch and continuous process control, and data handling processes—and said the latter two, he believed, had the greatest applicability to the iron and steel industry. He emphasized that the first step toward automation in any industry was the collection of operating data by means of full plant instrumentation. Only after complete operating data was available could the necessary operating rules be calculated for use with "on line" computers for automatic control.

Mr. S. S. Carlisle, an assistant director of BISRA with responsibility for automation matters, presenting an introductory review of automation in the industry, gave the following as examples of sections of steelworks practice where the technology was already available to apply more automation; hot and cold strip mills, primary and plate mills, and forging presses. There was, moreover, virtually complete instrumentation of the blast furnace and open-hearth furnace. It was, however, still necessary in most instances either to evaluate the case for further automation or to learn yet more about the fundamental logic and technology of the processes, so that the operating rules could be determined and then built into the computer control.

A paper by Mr. R. C. Gardner, of the Reed Paper Group, on automation in the paper industry was followed by a general discussion.

The final session of the conference was devoted to a Brains Trust, under the chairmanship of Lord Halsbury, consisting of:—Mr. W. F. Cartwright (Steel Company of Wales, Limited); Dr. J. H. Chesters (United Steel Companies, Limited); Mr. N. F. Dowding (Davy & United Instruments Engineering Company, Limited); Mr. R. H. Tizard (Associated Electrical Industries, Limited); Mr. A. J. Young (Imperial Chemical Industries, Limited), and Mr. M. J. F. Coales (Cambridge University).

The intensive exchange of questions and answers that took place during this session was witness to the success of the conference, the primary aim of which was to stimulate the industry's interest in automation and suggest ways in which it might profitably be applied in the near future. It was generally felt that other conferences should be held to consider specific aspects of a subject of immediate technical and economic importance.

Forthcoming Events

OCTOBER 24

Society of Chemical Industry (Corrosion Group):—Cathodic protection panel meeting at 14, Belgrave Square, London, S.W.1, at 6 p.m. Brains Trust.

OCTOBER 24-27

Iron and Steel Institute:—Meeting of the Iron and Steel Engineers' Group at Scunthorpe.

OCTOBER 25

Society of Instrument Technology:—Meeting at Mansion House, 25, Portland Place, London, W.1, at 6.30 p.m. "A New Method of Strip Speed Measurement Using Random Waveform Correlation," by M. A. Butterfield, G. F. Bryant, and J. Dowsing.

Institution of Chemical Engineers (North Western Branch):—Meeting at the Manchester College of Science and Technology, Jackson Street, Manchester, at 6.30 p.m. "Computors and their Application in Chemical Engineering," by D. W. Holman and J. J. Settle.

Institution of Plant Engineers (South Wales Branch):—Meeting at the South Wales Engineers' Institute, Park Place, Cardiff, at 7.30 p.m. "The Thermal Insulation of Factory Buildings," by N. Foster.

Institution of Mechanical Engineers (Southern Branch):—Meeting at the Small Town Hall, Reading, at 7.30 p.m. "Mechanical Engineering Education in Technical Colleges," by A. J. Till.

OCTOBER 26

Sheffield University Mining Society:—Visit to the Safety in Mines Research Establishment, Buxton.

Combustion Engineering Association (Midland Region):—Meeting at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham 2, at 10.30 a.m. "Scheduled Maintenance of Boiler Plant and Auxiliaries," by F. W. C. Hinton.

Society of Instrument Technology (South Wales Section):—Meeting in the Lecture Theatre of the Steel Company of Wales, Limited, Port Talbot, at 5.30 p.m. "The Automatic Control of Rolling Mills," by W. N. Jenkins.

Society of Chemical Industry (Corrosion Group):—Midlands Branch meeting at the Engineering Centre, Stephenson Place, Birmingham, at 7 p.m. "Will it Corrode?" by U. R. Evans.

Institution of Production Engineers (Shrewsbury Section):—Meeting at the New Technical College, London Road, Shrewsbury, at 7.30 p.m. "Development of Rubber in Engineering," by E. S. Kendall.

Institute of Marine Engineers (North Midlands Section):—Meeting at the British Iron and Steel Research Association Building, Hoyle Street, Sheffield 3, at 7.15 p.m. "The Care and Maintenance of High-pressure Watertube Boilers," by W. B. Harvey.

Institution of Mechanical Engineers:—Meeting at 1, Birdcage Walk, London, S.W.1, at 6 p.m. Presidential address. "The Scientist's Contribution to Mechanical Engineering," by Prof. Owen A. Saunders, FRS.

OCTOBER 27

Institute of Marine Engineers (West Midlands Section):—Meeting at the Engineering Centre, Stephenson Place, Birmingham, at 7 p.m. "Recent Developments in Pump Auxiliaries for Ships," by T. McAlpine and I. S. Paterson.

Institution of Plant Engineers (Merseyside and North Wales Branch):—Meeting at the Exchange Hotel, Liverpool, at 7.15 p.m. "On-load Water Washing of Economizers and their Heaters," by R. Sheen.

Institution of Plant Engineers (North East Branch):—Meeting at the Three Tuns Hotel, Durham City, at 7 p.m. "Inventions, Patents, and the Engineer," by C. P. MacCarthy.

Institution of Plant Engineers (Sheffield and District Branch):—Meeting at the Grand Hotel, Sheffield, at 7.30 p.m. "The Consultant and Personnel Management," by T. H. Hawkins.

Institution of Mechanical Engineers (Yorkshire Branch):—Meeting at the Royal Station Hotel, York, at 7.30 p.m. "Future Developments in Corrosion Prevention," by T. Henry Turner.

OCTOBER 28

Society of Instrument Technology (Scottish Section):—Meeting at the Building Centre, Sauchiehall Street, Glasgow, at 7.15 p.m. "Instrumentation of a Steel Strip Mill," by H. Gill.

Junior Institution of Engineers:—Meeting at Pepys House, 14, Rochester Row, Westminster, London, S.W.1, at 7 p.m. "Formed Ends for Chemical Plant and the Like," by J. M. Tebby.

Institution of Plant Engineers (Birmingham Branch):—Meeting at the Imperial Hotel, Temple Street, Birmingham, at 7.30 p.m. "Industrial Law," by T. W. Wright.

Institution of Plant Engineers (Western Branch):—Annual dinner at the Grand Hotel, Bristol.

OCTOBER 31

Wigan and District Mining and Technical College:—Joint meeting with the Junior Section of the Manchester Geological and Mining Society in the board room of the college at 5 p.m. "Modern Winding Installations," by J. M. Dobie, of British Ropes, Limited. Chairman, Col. G. G. H. Bolton, chairman of the North-Western Divisional Coal Board.

Institution of Production Engineers (North Western Region, Manchester Graduate Section):—Meeting at Reynolds Hall, Manchester College of Science and Technology, at 7.15 p.m. "Production Engineer's Route to the Board Room," by G. R. Pryor, president of the institution.

Institution of Plant Engineers (West and East Yorkshire Branch):—Meeting at the Houldsworth School of Applied Science, Leeds University, at 7.30 p.m. "The Building of a Modern Factory," by Philip Wyatt.

Institution of Electrical Engineers (East Anglian Subcentre):—Meeting at the Assembly House, Norwich, at 7.30 p.m. "Modern Coal-fired Power Stations," by A. E. Hawkins.

Institution of Electrical Engineers (Mersey and North Wales Centre):—Meeting at the Royal Institution, Colquitt Street, Liverpool, at 6.30 p.m. "The Application of Irradiation in Industry," by M. C. Crowley-Milling.

National Association of Colliery Managers

OCTOBER 25

South Wales Branch:—Meeting at the Castle Hotel, Neath, at 6 p.m. "The Electrogyro Locomotive," by J. K. Gessler.

OCTOBER 26

Lancashire Branch:—Meeting in the Lecture Room, Manchester Literary and Philosophical Society, George Street. "Trade Unions, Management, and the Government," by James Crawford, member for industrial relations, NCB.

OCTOBER 28

Kent Branch:—"Strata Control," by W. J. Adcock, head of strata control branch, production department, NCB.

NOVEMBER 4

North of England Branch:—Annual dinner and dance at the Old Assembly Rooms, Newcastle-upon-Tyne 1.

NOVEMBER 7

South Midland Branch:—Meeting at Ashby Rescue Station at 4 p.m. "The Workable Reserves of South Derbyshire and Leicestershire Coalfields," by M. Hall and W. J. Hutchinson.

NOVEMBER 15

Yorkshire Branch:—Meeting at the Miners' Welfare Hall, Brodsworth, at 3 p.m. "Analysis of Accidents During the Last Five Years," by J. Blunt.

NOVEMBER 23

Lancashire Branch:—Meeting in the Lecture Room, Manchester Literary and Philosophical Society, George Street. R. H. Clough, HM Divisional Inspector of Mines, will introduce his report on the North Western Division for 1959.

NOVEMBER 25

Kent Branch:—Meeting at the Swan Hotel, Deal, at 7.15 p.m. "The Coal Plough," by J. McFarlane, divisional mechanization engineer, Northern (N & C) Divisional Coal Board.

NOVEMBER 28

Midland Branch:—Meeting at the Denman's Head Hotel, Sutton-in-Ashfield, at 6.30 p.m. Paper by G. A. Percival, ventilation engineer, No. 4 Area, East Midlands Divisional Coal Board.

JOHN SUMMERS & SONS, LIMITED, Shotton, Chester, is now supplying corrugated galvanized steel sheets in lengths up to 22 ft. These long sheets are available in the standard 3-in. corrugation. Longer sheets can be supplied if customers provide suitable transport.

HYDROCARBONS IN BLAST FURNACES

Proving Feasibility of 75-year-old Idea

FOR more than two years the Esso Research & Engineering Company has been conducting a concentrated programme which, it is claimed, promises to result in one of the most important iron manufacturing developments in the past 20 years. Announcing this in New York, the company, which is the scientific affiliate of the Standard Oil Company, New Jersey, said the project was aimed at proving the feasibility of a 75-year-old ironmaking idea. The concept that has now been developed by scientific studies and experiments is that hydrocarbons, particularly heavy oil of high heat content, can be successfully injected into the bottom of blast furnaces and, in many circumstances, can increase capacity and decrease costs of " hot metal " production.

Esso Research investigated the practicality of the idea, and in an intensive programme solved the complex problems involved and developed an injection and control system which makes the idea usable. Mr. M. J. Rathbone, president of the Standard Oil Company, said: "This development is one result from a comprehensive programme which the company and its affiliates are conducting with Esso Research scientists to explore new uses for petroleum products. This work with respect to ironmaking can be of substantial importance to two basic industries—steel and oil—and to the free world's economic strength."

The scientific principles underlying the new development involve taking advantage of the chemical properties of oil as well as its heat-producing ability, the Esso Research statement points out. Blast furnaces produces pig-iron in hot liquid form by extracting oxygen from iron oxide. The blast furnace is actually more of a chemical plant than a furnace. Oil, which contains hydrogen, contributes additional " reducing " gas to speed the reduction of ore into iron. Coke, iron ore, and limestone are today fed into the top and hot air into the bottom of blast furnaces where temperatures reach some 1,900 deg. C. With the new fueling method, oil can be injected along with the heated air. The petroleum fuel serves as part of the source of heat and of the " reducing " gases.

The statement continues: " One of the most important Esso Research developments for this application of oil is the fuel injection and control system. Since blast furnaces 'stay on the line' for as long as eight continuous years, this system must be so designed that it can be installed into large furnaces without any interruption in the use of the furnace. In arriving at a suitable system, the company designed, built, and operated a pilot plant simulating that part of a blast furnace most critical to oil injection. A unit of this system was later installed and tested in a hot operating large-scale furnace with complete success.

" The company noted that some United States and European steel firms had been working along similar lines with natural gas injection, and that there are reports that some Russian blast furnaces are using natural gas to increase their ironmaking capacity.

" The Esso Research study is still continuing on experimental and full-scale furnaces to get more accurate data on capacity increase and saving in operating costs."

Australia May Export Iron Ore

AUSTRALIAN Government policy of prohibiting export of iron ore is over-cautious, it is now believed, and a proposal has been made to couple the sale of iron ore with coal. Limited exports would increase earnings and encourage the search for high-grade ore. If iron-ore exports were permitted, it is considered that Australian mineral exports could be trebled by 1975.

The Minister for National Development has stated that large deposits of iron ore were discovered by the Bureau of Mineral Resources in a recent survey, the first carried out in 20 years. Quality of the ore is uncertain, as little, if any work has been done on many of the deposits. It has been found that fields already being worked are more extensive than had been thought previously, particularly the Yampi Sound deposits and the iron-ore occurrences in South Australia.

Samples of iron ore from Mount Goldsworthy, near Port Hedland, in Western Australia are reported to be of a standard high enough to make the ore attractive to oversea smelters. The Premier of Western Australia has said that so far as drilling had gone, the Mount Goldsworthy ore, together with the testing of the Koolyanobbing deposit, indicated that it would be an economic proposition to process iron ore in the State.

CANADIAN PRODUCERS' DESPATCHES of iron ore reached an all-time record of 21,854,468 short tons in 1959. This was 9.5 per cent. above the 1956 record of 19,953,820 tons and 55 per cent. above the total for the recessional year 1958. Shipments from all producing provinces increased.

Nuclear Generating Station in Scotland

CIVIL engineering work on the two reactor structures and the turbine hall of the £40,000,000 Hunterston nuclear generating station, 35 miles from Glasgow, has now been completed. The station is being built for the South of Scotland Electricity Board and the first reactor is expected to be on load for the winter of 1962-63 and the second for the autumn of 1963.

The last sections of the concrete biological shield of the first reactor having been lifted into position, a start has been made on the erection of the structure to house the service machine. This machine is already being assembled for testing at the Erith works of the General Electric Company, Limited, which is the main contractor.

The emphasis on construction has now moved away from civil engineering to mechanical engineering, with the fabrication and installation of the pressure vessels, steam-raising units, mechanical and electrical plant. It is hoped that the labour problems associated with the assembly of the pressure vessels and steam-raising units have now been resolved.

Satisfactory Progress

Since work restarted in January of this year, production has been maintained at a satisfactory level. Inside the first reactor structure, for instance, the assembly of the 3 in. thick 70-ft. dia. pressure vessel is complete, all courses having been placed and welded together, with the core support grid and inner heat shield located inside the vessel. The vessel is now being prepared for stress-relief.

The supporting skirt of the second reactor pressure vessel has been fabricated *in situ* inside the biological shield and the combined bottom head and support course and No. 2 course have been lifted into position.

Elsewhere on the site fabrication and assembly of the steam-raising units has been going ahead; several of the 210-ton vessels having been stress-relieved and hydraulically tested, are now in the final stages of construction, which includes nuclear clean conditioning. The first steam-raising unit associated with the first reactor was recently lifted by a crane on to its plinth and preparations for tubing and gas circulator installation are already under way. Sections of the clean-conditioned gas ducting linking the reactor pressure vessel with the steam-raising units have arrived on site.

Externally, the 680-ft. long turbine hall appears complete, although internally much work is in progress. Three of the six condensers are installed, while the foundations for the turbo-generators are ready, awaiting the arrival of the sets themselves.

Further down the coast, to the south of the main part of the site, is the circulating water pump-house. This building is finished and much of the equipment, including pumps, motors, bandscreens, valves, filters, etc., is installed. The associated culverts and tunnels on the intake side of the circulating water system have been completed. On the outfall side, some 600 yd. further up the coast, the tunnels have been driven and are now being lined and the siphon seal is almost finished, bringing the end of civil work in sight.

The area of the site is 110 acres, of which 17 acres have been reclaimed from the sea. The total steel to be used in the construction of the nuclear power station is estimated at 17,000 tons and the weight of each reactor, including the pressure vessel and contents, is 80,000 tons.

Principal contractors for the design and erection of plant are:—General Electric Company, Limited (main contractors); Simon-Carves, Limited; Motherwell Bridge & Engineering Company, Limited, and Mowlem (Scotland), Limited.

Contribution from UK at Yugoslav Symposium

INCLUDED in a symposium on steel smelting, coke production, and related problems at Portoroz, Yugoslavia, was a paper on the "Rexco" low-temperature carbonization process, presented by Mr. R. Middleton, engineering sales manager of Newton, Chambers & Company, Limited, Thorncliffe, Sheffield, and Mr. J. Brown, of the National Carbonizing Company, Limited, London, S.W.1. The paper was illustrated with slides and flow diagrams of the large "Rexco" installation at Edwinstowe, for which Newton, Chambers was the main contractor to the National Carbonizing Company.

Mr. Middleton and Mr. Brown went to the symposium, which lasted from September 18 to 23, with representatives of the Société d'Etude et de Construction Evence Coppee, S.A., of Brussels.

Yugoslavian steel production is being increased. At present, imported coking coals are carbonized in conventional coke ovens, but investigations are being made into the possibility of augmenting the supply of coking coals with the addition of low-temperature char. The use of low-temperature char alone in direct-reduction processes is also being investigated.

Development of Pakistan Coal Mines

EXPENDITURE of Rs. 26,500,000 on the development of the Sore Range coal deposits in the Quetta region is scheduled during the Second Five-Year Plan of Pakistan. Lt.-Gen. Haji Iftikhar Amad, chairman of the Pakistan Industrial Development Corporation, said that Rs. 18,300,000 would be spent as initial cost and the rest on maintenance. A scheme for the development of the Sore Range area had been accepted in principle, he said, but the Shah Ragh scheme was yet to be decided.

Referring to the Sore Range coalfields, he said that development work would start shortly. He expressed the hope that in about four years' time the output of coal in the Sore Range area would be about 400 tons a day and in six to seven years' time it would have a daily output of 1,000 tons. The Sore Range area is said to have deposits of about 7,000,000 tons of coal.

MAGNETIZING REDUCTION in a Recuperative Rotary Furnace

DOMNARVET PILOT PLANT RESULTS

A RECUPERATIVE rotary furnace with a tubular heat exchanger for the magnetic roasting of hematite ore between 1 and 2 mm. is described by Sven Eketorp, assistant director of research of the Stora Kopparbergs Concern, Sweden, in a paper presented at the International Mineral Processing Congress, organized by the Institution of Mining and Metallurgy and held in London recently. The author also gives details of the process, including a heat balance and indicates the results to be expected in treating coarser ores. Extracts from the paper are appended. The full paper is published with over 50 other papers in the "Proceedings of the Congress," obtainable from the secretary of the Institution of Mining and Metallurgy, 44, Portland Place, London, W.1.

At the outset the author explains that the term "magnetizing reduction" has been substituted for "magnetic roasting" because the term "roasting" generally applies to an oxidizing process. He goes on to point out that the pilot plant furnace now being tested in Domnarvet is a horizontal firebrick-lined rotary unit encompassing a heat exchanger and ore-removing apparatus. The furnace is 900 mm. internal diameter, the length overall being 6 m. The cylindrical shell is lined with fireclay bricks and insulating bricks. The end of the furnace where the reduction gases are admitted is removable. The heat exchanger and the ore-removing apparatus are both made of plain carbon steel.

Movement of Ore

With reference to Fig. 1, the movement of ore is accomplished in the following manner. Raw ore is fed into a compartment 1 and then scooped by channel 2 into another compartment 3 which opens into the heat exchanger. This consists of 40 3-in. tubes, each containing a spiral which with the furnace rotation causes the ore to move through the tubes. These spirals are fixed and do not move in relation to the tube walls. The tubes discharge the ore into the preheating chamber 4, where the excess reduction gases are burnt with secondary air 5, preheated in the exchanger by the passing ore. The secondary air is admitted through a number of small inlet tubes, thus presenting a large surface area for heat transfer. The ore passes from the preheating chamber into the reduction chamber 6, from which it is discharged over a baffle 7. The ore is moved through the successive chambers solely by displacement, a result of continuous feeding.

After leaving the reduction chamber the ore stream is reversed in direction and brought back to the heat exchanger by five tubes 8: these are 5 in. dia., each containing a spiral. These discharge the hot ore on the outside of the tubes containing the incoming ore, thus effecting a counter-current solid-solid heat exchange. The cooled ore 125 to 150 deg. C., leaves the heat exchanger through a peripheral opening 9, and is discharged from the furnace over a baffle 10, which assures a high level of ore in the outgoing system of the heat exchanger. Hot reduction gas is introduced through an opening 11 and moved counter-current with the ore in the reduction chamber, the excess reducing gases being burnt with preheated secondary air in the preheat chamber. All waste gases are then passed through the tubes of the heat exchanger, effecting a counter-current gas-solid heat exchange. Their temperature on leaving the system is 100 to 125 deg. C.

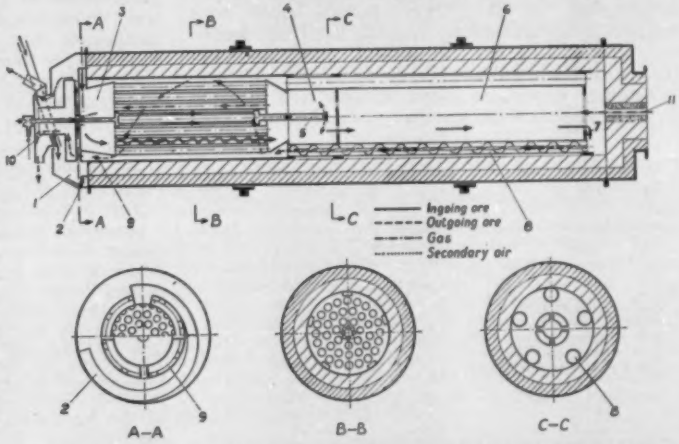

FIG. 1.—LONGITUDINAL SECTIONAL ELEVATION AND CROSS-SECTIONS OF RECUPERATIVE ROTARY FURNACE FOR MAGNETIZING REDUCTION OF IRON ORE.

The incoming ore between 1 and 2 mm. is preheated to approximately 500 deg. C. in the heat exchanger and then to 650 deg. C. in the preheat chamber. The temperature gradient in the reduction chamber, 100 to 150 deg. C., is caused by the sensible heat in the hot reduction gases at 1,300 deg. C.

The dimensions of the heat exchanger are functions of the production capacity desired and the surface area required for an efficient exchange of heat. The capacity of a single tube is a function of the speed of revolution of the furnace, the diameter of the tube, the pitch and height of the spiral in the tube, and the volume of the ore.

Processing Details

The most interesting feature of this recuperative furnace is the low fuel consumption. In pilot-plant tests the oil consumption has been 13 to 14 kg./ton of feed, *i.e.*, 130,000 to 140,000 kcal./ton (500,000 to 550,000 Btu/ton). This small figure is due to the low temperature of the exit product and waste gas and to the almost complete utilization of the gas. The incoming gas is 30 per cent. H_2 + CO with a small amount of free carbon, while the waste gases are approximately 20 per cent. CO_2 and 2 to 3 per cent. H_2 + CO. With such a low fuel consumption the volume of waste gas per ton is correspondingly low, and therefore only small dust losses are experienced. During the operation of the furnace the dust has been collected in a cyclone and circulated in the system, and the dust collected has always been between 1 and 2 per cent. of the product; the amount going up the stack was negligible. The feed may contain as much as 3 per cent. moisture, which is usual for ore coming from the mine. This is an obvious advantage as pre-drying is not required.

To obtain good results at a low fuel consumption, good control of the furnace temperature must be achieved. In this process adequate temperature control is maintained by regulation of the secondary and primary air. A normal heat balance for the process is as shown in Table I.

Another important aspect of this new furnace is the relatively high specific production achieved,

TABLE 1.—*Heat Balance.**

	Mcal/ton.	Per cent.
In		
Oil consumption, 14 kg./ton	139	97
Exothermic reaction	5	3
	144	100
Out		
Reduction to Fe_3O_4†	65	46
Vapour, 2 per cent. H_2O	12	8
Heat in outgoing ore (150 deg. C.)	33	23
Heat in waste gas (125 deg. C.)	4	3
Chemical heat in waste gas	8	6
Heat losses	20	14
	142	100

* Basis: 1 ton of feed (34 per cent. Fe as hematite) at 500 kg./h.

† This heat is not the heat required for the reduction of hematite as that is an exothermic reaction; it is rather the chemical heat of the CO and H_2 that is lost owing to their reaction with hematite and not oxygen.

i.e., 6 ton/cu. m. total furnace volume/day—a figure considerably higher than has been attained in more conventional rotary furnaces. Specific production values are generally below 1 ton/cu. m./day for such furnaces on a pilot-plant scale, and 2 to 3 ton/cu. m./day for commercial operations. Capital outlay for a furnace, being a very important item in the cost of magnetizing reduction, makes high specific production desirable.

Treatment of Ore Fines

The recent tests at Domnarvet showed that there are several advantages in treating a relatively fine ore, that is, 1 to 2 mm. The increased surface area increases the rate of raising the temperature of the ore; it increases the rate of reduction per ton of ore, and it provides for greater thermal efficiency in the heat exchanger.

The fine particle size *per se* offers the advantages of less time for complete reduction of any given particle in the furnace, and of less wear on the metallic parts of the furnace. No problems were experienced when treating ores as fine as 100 mesh.

Treatment of Coarse Ores

The tests have also shown that when treating coarse ores, only partial reduction is obtained. This is contrary to results obtained in other furnaces and is presumably a result of the low fuel consumption, most of the gas necessarily being used for reduction of the ore rather than as a source of heat. Because most of the heat is kept in the system, reduction can be obtained with a mass flow rate of gas per volume of ore, just greater than stoichiometric amounts, but in other furnaces where fuel consumption is not low, the mass flow rate of gas (per volume of ore) is much greater. It follows that, since the rate of reduction is proportional to the mass flow rate of reducing gas, particles above a certain size will not be reduced, and the maximum particle size in the recuperative furnace is therefore smaller than that of other furnaces for similar retention times. It may be possible, however, to use the recuperative furnace for treatment of coarse ores and still maintain a low fuel consumption by including it in a closed circuit. In such a case the furnace is operated at maximum production with low oil consumption per ton of ingoing material.

The product from the furnace goes directly to a magnetic separator, where a primary, and final, tailing is removed, the primary concentrate and middling then being ground to the final size and passed over a second magnetic separator. The concentrate from this separator will be the final product for the circuit and the tailing and middling will be returned to the furnace. This procedure has the advantage that the furnace is used to produce magnetite only and that the regulation of the Fe content of the products is done outside the furnace. The disadvantage of this method, however, is that some of the ore must be treated more than once, but this has little effect on the fuel consumption as the treated ore leaves the furnace

at a relatively low temperature. A second possibility for the treatment of a coarse ore is complete reduction followed by the necessary grinding.

It is impossible to give exact production costs without detailed information on the cost of a commercial unit and without having operated over an extended period. Calculations based on pilot-plant operation only and estimates of capital cost, and a production of 200,000 ton/year, working 24 hr. a day (30 ton/hr., 6,700 hr. of operation), and a Swedish ore containing 34 per cent. Fe as hematite, ground to −1 mm. and assuming up to 3 per cent. moisture, give the approximate equivalent cost as 10s. 6d. per ton.

Safety Officers' Annual Conference

PROGRAMME of the Institution of Industrial Safety Officers, to be held at Lytham St. Annes (Lancs) from October 28 to 30, will include papers on the medical aspect of protection by Dr. G. O. Hughes, chief medical officer of the North Western Gas Board, on protection from machinery by Mr. R. Bramley-Harker, safety adviser to Wiggins Teape & Company, Limited, and formerly a Deputy Chief Inspector of Factories, on the protection required by the law by Mr. R. K. Christy, HM Deputy Chief Inspector of Factories, and on protective clothing by Mr. N. T. Freeman, works personnel officer at the Billingham works of British Titan Products, Limited.

Over 100 industrial safety officers will discuss problems allied to these subjects which affect their own industries, which may vary from the production of steel to consumer goods and services such as gas and electricity. Mr. D. P. Welman, chairman of the North Western Gas Board, will be the principal speaker at the opening dinner, while Mr. W. F. Evans, HM Deputy Chief Inspector of Factories, and Brig. R. F. E. Stoney, director-general of the Royal Society for the Prevention of Accidents, will be among the guests.

Rectifier Transformers for Cross-Channel d.c. Power Link

TWO rectifier transformers under construction at the Walthamstow works of Fuller Electric, Limited, were inspected by senior officials from the Central Electricity Generating Board on September 28. This Hawker Siddeley group company is building the special transformers, believed to be the largest of their type, as part of the group contribution to the cross-channel d.c. power link project between Britain and France.

Individual transformer output is 95/95/65 mVA., three-phase, 50 cycles. Each transformer has three windings giving a no-load voltage ratio of 284/83.6/33 kV with a tapping range of plus and minus 15 per cent. controlled by a Fuller high-speed resistor transition on-load tap changer.

TWO TYPES of anti-freeze radiator fluid for use in the radiators of petrol and diesel engines are defined in National Coal Board specification No. 190/1960.

FRENCH STEEL PLANT FOR ALGERIA

PLANS for the setting up of an iron and steel industry at Bone, Algeria, have just been announced by M. Paul Delouvrier, delegate-general of the French Government in Algiers, as part of the Constantine Plan for the industrialization of Algeria. Preparatory surveys have been completed and an immediate start is to be made on construction of the necessary plants.

The investments necessary will amount to about 820,000,000 new francs (£65,000,000). Initial capital (amounting to about £10,000,000) will be subscribed on the following basis:— 51 per cent. by 32 French iron and steel companies; 20 per cent. by the Société de l'Ouenza, and 29 per cent. by banks and investment companies such as the Banque de Paris et des Pays-Bas, Banque Industrielle d'Afrique du Nord, etc. Additional finance up to £65,000,000 will be provided by the Société Bonoise de Siderurgie, the Equipment Fund for the Development of Algeria, and from long-term loans.

The plans provide for the construction of a plant for the treatment of the iron ore, a steel plant capable of producing 500,000 tons of raw steel per annum, and rolling mills. The metal-producing plant is scheduled for completion by 1962 and the whole centre is expected to be in operation in four or five years.

Iron ore from Ouenza (distant about 100 miles by rail from Bone) will be used by the new steel plant. There are several potential sources of power in the area—electricity from the hydro-electric power station at present being built at Djen Djen, oil from Hassi Messaoud, and natural gas from Hassi R'Mel. The port of Bone will have to be modernized to cope with increased traffic. The plant will employ about 3,000 workers; indirectly, however, it will give employment to about 15,000 people.

Exhibition of Modern Industrial Metals

Designed to interest all concerned with engineering problems involving the use of metals, an exhibition is being presented by the Mond Nickel Company, Limited, at the South Wales Institute of Engineers, Park Place, Cardiff, from November 1 to 4. The main emphasis of the exhibition will be upon the properties of nickel-containing materials and the platinum metals. Lectures will be given each day by members of the company's development and research department and opportunity will be afforded for technical discussions. Films will also be shown. A programme of the lectures and film showings can be obtained from the company at 20, Albert Embankment, London, S.E.11.

VENEZUELAN production of iron ore in the first six months of 1960 amounted to 9,838,479 tons, compared with 7,951,865 tons in the first half of 1959.

Hydrogenation of Coal to Methane

PROCESSES for producing town gas by completely gasifying coal instead of by carbonizing it have been receiving increased attention in recent years. Meeting the requirements that the gas produced shall have combustion characteristics similar to those of town gas produced in existing processes, and that it shall meet future specification in regard to toxicity, places greater importance than hitherto on the constitutent methane. In the most suitable gas likely to be derived from future processes, about two thirds of the heat units may be derived from methane and almost all of the remainder from hydrogen. It follows that unless the methane can be obtained economically from coal, the part to be played by coal in gasification methods for town gas production may be severely limited.

The overall position and the gas industry's researches aimed at solving the technical problems facing it in producing a sufficiently rich gas without resort to enriching processes based on oil were reviewed by Dr. F. J. Dent in the ninth Coal Science Lecture of the British Coal Utilization Research Association, delivered in London on Wednesday of last week. Dr. Dent is director of the Midlands Research Station of the Gas Council at Solihull (Warwickshire).

The Lurgi Process

In the most advanced process at present available for completely gasifying coal to make town gas—the Lurgi process—only about half the methane needed is produced, and enrichment with petroleum products is necessary. Gasification of coal in the Lurgi process (developed in Germany in the 1930s) is carried out at a pressure of 20-30 atmospheres and uses a mixture of oxygen and steam as the gasifying agent; it results in the production of much more methane than if the process were operated at atmospheric pressure. One basic discovery by Dr. Dent in the early '30s was that the high methane content of Lurgi gas arises from reaction between hydrogen and the coal substance in the fuel bed, *i.e.*, the straight hydrogenation of coal.

Dr. Dent outlined the laboratory investigations into the hydrogenation reaction. The investigations had shown that there are two distinct phases in the attack of hydrogen on the coal substance, the first occurring during the rise in temperature from 500 deg. C., when the coal molecules are unstable and yield volatile material; and the second occurring when a final steady temperature is attained, the coke residue then assuming some stability.

Under optimum conditions of temperature and pressure, at least 85 per cent. of the coal substance can be hydrogenated to give a methane yield of 500 therms or more per ton of coal.

Pilot-scale experiments had been conducted, using a fixed fuel bed, the heat released during the reaction being adequate to sustain it; in the laboratory experiments, however, external heating had been necessary, Dr. Dent indicated. The effectiveness of the heat of the hydrogenation reaction as a means for rapid carbonization of the fuel was also demonstrated; but if the temperature autonomously attained reached too high a figure, the methane yield was found to suffer.

Experiments with fluidized beds allowed more rigid temperature control and led to the proposal that the process should be operated at 25-50 atmospheres pressure in two stages. In the first, operating at 800-850 deg. C., the "volatiles" would be hydrogenated, and in the second, 900-950 deg. C., the carbon residue.

Dr. Dent indicated that valuable experience had been gained during work on the hydrogenation of oil and this had contributed to the design of a recently erected pilot plant for the hydrogenation of coal.

Two proposals for making gas with a calorific value of 600 Btu/cu. ft. using hydrogenation reactions were described; both had overall thermal efficiencies in the region of 75 per cent. In the first, all the coal would be hydrogenated, the "char" being used to produce (*a*) from water gas the hydrogenating gas, as well as (*b*) the steam requirement.

In the second, run-of-mine fuel would be used, the "large" fuel being gasified in a slagging fixed bed gasifier to produce the gas for hydrogenating the "fines"; the residue from hydrogenation would be used for steam raising. The second process was shown to require a higher, but not unattainable, standard of performance from the hydrogenation stage.

Dr. Dent concluded by admitting that formidable chemical engineering problems have to be overcome, but holding the view that successful incorporation of hydrogenation into a process to produce gas solely from coal should be possible.

Coal Research in Australia

PROGRESS in coal research in Australia is reviewed in the annual report of the coal research section of the Commonwealth Scientific and Industrial Research Organization. Important work has been done to improve the chemical and physical properties of cokes made from Australian coals, especially those from the northern coalfield of New South Wales, which have a high percentage of volatile matter.

Progress also continues in the systematic assessment of Australian coal resources. During the year ended June 30, 1960, this assessment was concerned mainly with Queensland coal and has yielded data with an important bearing on coal exports. An associated study has been concerned with the nature of the mineral-matter content of brown and bituminous coal, one objective of which is to determine whether untreated Australian small coals are likely to prove suitable for firing in cyclone slagging furnaces.

NATIONAL ASSOCIATION OF COLLIERY MANAGERS

1961 CONFERENCE WILL OPEN ON A TUESDAY

EDINBURGH for the 1961 conference of the National Association of Colliery Managers. And the dates are June 6, 7, and 8. Members are asked to make a particular note of the dates, for on this occasion they cover Tuesday, Wednesday, and Thursday—*i.e.*, the conference starts and finishes a day earlier than usual.

Headquarters of the conference will be at the North British Hotel. The technical sessions and most of the social events will take place, according to present arrangements, at the Assembly Rooms in George Street.

The NACM states that it cannot on this occasion undertake the booking of hotel rooms. Members should make their own reservations with the hotel of their choice, and are advised that hotels in Edinburgh tend to be booked quickly in June. Early application is therefore strongly recommended.

The publicity officer of Edinburgh Corporation, Miss L. R. Rhind, City Chambers, Edinburgh 1, will gladly send, on application, a full list of hotels and other accommodation. Some of the principal hotels are listed below, the price stated being the approximate cost per person of room and breakfast.

Licensed Hotels.—Caledonian, Princes Street, 48s. 6d. Carlton, North Bridge, 32s. 6d. Clarendon, Grosvenor Street, 35s. George, George Street, 50s. Grosvenor, Grosvenor Street, 27s. North British, Princes Street, 48s. 6d. Royal British, Princes Street, 35s. Royal, 53, Princes Street, 32s. 6d. Rutland, Rutland Street, 26s. 6d.

Unlicensed Hotels.—Adam Hotel, 19, Lansdowne Crescent, 25s. Green's, 24, Eglinton Crescent, 30s. Old Waverley, 43, Princes Street, 28s. 6d. Palmerston Place, 56, Palmerston Place, 25s. Rothesay, 7, Rothesay Place, 27s. 6d. Royal Stuart, 18, Abercrombie Place, 33s. St. Andrew, 3, St. Andrew Street, 23s.

Loading Iron Ore at Madras

A NEW mechanized berth for loading iron ore was inaugurated at Madras harbour on September 28 by the Indian Minister of State for Transport and Communications, Mr. Raj Bahadur. The Minister said that India's exports of iron ore, a valuable earner of foreign exchange, were expected to reach 15,000,000 tons a year under the Third Plan; it was largely for this reason that the ports of Tuticorin and Mangalore were being developed into major ports under that plan.

The new berth at Madras, however, comes among the major projects of the Second Plan. It comprises an ore berth and an ore yard with all the necessary equipment, and has cost rather over £750,000. It can handle up to 1,000,000 metric tons of ore annually, but can be used alternatively for handling general cargo.

A.B. Trepanner's Contribution to Coal-getting

NOTABLE contribution to the winning of coal by mechanized methods in this country is being made by the A.B. longwall trepanner manufactured by Anderson, Boyes & Company, Limited, Motherwell. In 1959 over 10,000,000 tons of coal were obtained from installations using this machine for power loading. With the substantial growth in numbers of trepanner installations, present indications are that the tonnage of coal obtained this year will at least be 50 per cent. greater than that obtained last year.

A feature of the increasing application of this machine is that the face efficiency in terms of manshifts per 1,000 tons of coal obtained continues to improve, the current figure being of the order of 125 (8 tons output per manshift). Apart from its high productivity and the considerable tonnage which it is capable of producing, a particular feature of the trepanner is the satisfactory sizing of the coal obtained.

Not only at home but also oversea there is a growing interest in the trepanner and several have been exported. At the recent Brno International Fair, a machine of this type was on the Anderson, Boyes stand and, having been purchased for the Czechoslovakian mining industry, it is expected to go to work before the end of the year. Anderson, Boyes has maintained close contact with the Czechoslovakian mining industry since the end of the last war when a variety of A.B. coal-cutters was delivered under the auspices of UNRRA.

Standardization of Crane Signals

Possibility of establishing a standard system of crane signals in the civil engineering industry is being considered by the Federation of Civil Engineering Contractors. Such a system, says the federation, should help to reduce accidents. Investigations by the federation show that systems in use have similar characteristics, but vary in detail. Comments on the advantages or disadvantages of these systems may be addressed to the Federation of Civil Engineering Contractors, Romney House, Tufton Street, Westminster, London, S.W.1.

West European Coal Producers Visit UK

STUDY committee of the West European Coal Producers last week paid a two-day visit to London for discussions with the National Coal Board on matters of common interest, and for a tour of the Board's mining research establishment at Worton Hall, Isleworth. At the first meeting at Hobart House on Tuesday, Sir James Bowman, chairman of the NCB, presided at a general survey of the coal industry in the UK and in the Community countries. This was followed by a general discussion on the Robinson Report, which was opened by Mr. A. H. A. Wynn, the board's scientific member.

During the visit to Isleworth in the afternoon, the committee saw work on the latest coal winning devices, methane drainage control instrumentation, and dust and strata control measuring instruments. On Wednesday morning discussions were held on the general commercial situation and marketing objectives, solid fuel publicity, and services of the NCB and in the afternoon a general discussion on clean air was opened by Mr. E. H. Browne, deputy chairman of the Board.

The study committee consisted of the following:—Chairman, M. Jean Couture, assistant director general of Charbonnages de France; vice-chairman, Herr Bergassessor H. Burckhardt, president of the Ruhr Coal Mines Association; M. H. H. Wemmers, president of the Staatsmijnen, Limburg, and of the Gezamenlijke Steenkolenmijnen, Limburg; Mr. P. Baseilhac, director-general of Charbonnages de France; M. E. Leblanc, president of the Federation Charbonnière de Belgique; M. P. A. A. Wirtz, director of the Oranje-Nassau Mines, Heerlen; Herr K. Haver, director general of central committee of organization of the Ruhr Coal Mines Association; M. J. Walch, director delegate of the Houilleres de Bassin du Nord et du Pas de Calais; M. A. A. G. Janssens, advisor to the committee; Herr Bergassessor R. Hartmann, member of the direction, Ruhr Coal Mines Association; M. A. Woronoff, general secretary to the committee; M. M. Hecquet, marketing director of Charbonnages de France; and M. Michotte, Federation Charbonnière de Belgique.

Danish Youth Learns about Coke

COKE exports to Denmark last year gained for Britain almost £2,000,000. A campaign to increase coke sales there has gained for 50 Danish children a four-day trip to Britain.

The children—aged 14 to 17—are winners in an essay-writing competition which has been held in Denmark. They were welcomed in London on Tuesday by Mr. A. H. A. Wynn, on behalf of the National Coal Board and the British Coking Industries Association.

The competition was arranged by an organization set up by British, Dutch, Belgian, and German coke producers to promote coke sales in Scandinavia. Another party of 50 children—also prize winners—went on a trip to Western Germany.

British coke exports to the Scandinavian countries last year amounted almost to 1,000,000 tons, worth nearly £6,000,000.

Pit Labour Shortage in Wales "Desperate"

DURING a tour of the £3,000,000 Rose Heyworth drift mine, Abertillery, last week, Mr. Lister Walker, general manager for the No. 6 (Monmouthshire) Area of the South-Western Divisional Coal Board, said: "We are desperately short of labour—not of surface people, but underground workers. The No. 6 Area is a 20,000-man Area, but at present we are down to 17,000. We were losing 50 men a week until last week, when a few were gained."

Mr. Walker, who was inspecting new installations at the mine, accompanied by NCB and colliery officials, said the Area could do with at least another 1,000 men, while at the new Rose Heyworth mine alone they could take on another 200 men. "We are only meeting the demand for coal by picking up supplies from stocks," he said.

Of the Rose Heyworth drift mine, which will bring about the integration of two of the oldest mines in the Area, Cwmtillery, sunk in 1850, and Rose Heyworth, sunk in 1870, Mr. Walker said he thought it would be one of the most efficient and economic pits in Monmouthshire. It had first-class, co-operative workers. "New techniques are developing and we are going to mechanize more and more, but we will still need plenty of manpower."

Production started at the mine in June, but improvements are expected to continue until the end of the year. It is planned to produce 600,000 tons of coal a year, 60 per cent. of the output coming from a seam with an average thickness of 2 ft. The coal will be of high quality, much in demand for steel making, with reserves sufficient to last for about 35 years.

Metal Closures and F. Francis Discuss £9,000,000 Merger

DISCUSSIONS are taking place between the boards of Metal Closures, Limited, and F. Francis & Sons (Holdings), Limited, with a view to a possible merger of the two companies. Metal Closures makes bottle seals, while F. Francis & Sons manufactures tin boxes and steel drums and their combined assets would exceed £9,000,000.

Both companies have been expanding recently, Metal Closures acquiring John Dale, Limited, and Ideal Capsules, Limited, and F. Francis taking over Lacrinoid Products, Limited, last month. A further announcement, which shareholders of each company are advised to await, will be made as soon as possible.

Belgian Miners Demonstrate Against Closures

HUNDREDS of miners from the Borinage area protested in Brussels on Wednesday against the closing of some pits—the recommendation of the European Coal and Steel Community. The pits are to be closed next year. Armed police clashed with the demonstrators in front of the offices of the Belgian Mines Board.

A strike of miners in the Borinage area was claimed to be 90 per cent. effective. Municipal office workers in the region staged a one-hour sympathy strike.

Export Credit Facilities

GOVERNMENT MUST GIVE INCREASING AID

"THE post-war period of full order-books, and the consequent feeling of security engendered by steady production, have made it difficult to realize the inexorable facts of competition. Many touchline critics—who bear our embarrassment with great fortitude—tell us that the problem is a simple one of producing more at less cost. It is usually those who are not responsible for finding the ways and means of solving this economic equation who are most critical and unhelpful."

This comment was made by Mr. J. B. Woodeson in his presidential address to the North-east Coast Institution of Engineers and Shipbuilders at Newcastle-upon-Tyne on Monday. Mr. Woodeson, who is chairman of Clarke, Chapman & Company, Limited, and a director of the Nuclear Power Plant Company, Limited, stressed that recurring wage claims and demands for shorter hours had brought export prices to the danger point. In some industries further claims could not be afforded unless there was an equal compensation by extra effort and understanding on the shop floor.

A certain degree of re-education of their workpeople was required in order to introduce new practices and eliminate old ones. "I am convinced that if greater care was taken to ensure that our workpeople fully understood the overall situation we would be impressed by their response," he said.

Penal Taxation

At present, he said, there was a severe European challenge to Britain's major industries. In the spheres of technical design progress, productivity, and finally in selling terms, certain oversea organizations were competing so vigorously that several long-standing customers had placed recent business elsewhere. For political reasons taxation had been maintained at a penal level which made it extremely difficult for industry to re-equip itself with the modern capital plant so essential if progress was to be maintained.

"A vital factor that has been lacking is Government credit assistance, which is needed to expand our exports in the increasing number of markets now requiring long-term finance. Several instances have come to my notice recently of continental competition offering much better credit facilities than we could afford to offer. And these terms can be possible only through the backing given to them by their respective governments in some form or another."

Automation and mechanization were essential to higher productivity. "As our products become more complex, do we devote sufficient time and attention to arranging our workshop methods and to the planning and control of the work itself," Mr. Woodeson asked. "Many managements are still reluctant to reorganize and adopt more systematic methods of planning and production—especially those employing self-sufficient works departments of traditional pattern."

S. SMITH & SONS (ENGLAND), LIMITED—Mr. G. B. G. Potter has retired from the board.

Shepcote Lane Rolling Mills Appointment

ON the retirement of Mr. C. E. Holmstrom as chairman of Shepcote Lane Rolling Mills, Limited, Mr. J. T. W. Dewar has been appointed to succeed him. Mr. Dewar is managing director of Firth-Vickers Stainless Steels, Limited, which owns Shepcote Lane Rolling Mills jointly with Samuel Fox & Company, Limited. He is also a director of the English Steel Corporation, Limited.

MR. J. T. W. DEWAR

Mr. Holmstrom is also retiring from the board of Firth-Vickers Stainless Steels, with which company he has been associated from its formation in 1934 when he joined it as sales manager. He later became its managing director but relinquished that post in 1958.

Lancashire Scheme to Encourage Smaller Exporter

AS part of a scheme by Manchester Chamber of Commerce to back up the Prime Minister's exhortations to increase exports, some 300 merchanting firms with wide experience in the field are to make their knowledge available to smaller north-western companies which are not at the moment in the export trade. The chamber has set up a panel to bring the two interests into contact.

Mr. Roland Thomas, chairman of the chamber, said that there were something like 15,000 firms in the north-west, many of whom had never even thought of exporting. If one in five of them exported it would make a powerful addition to the country's trade.

GAS-PRODUCING PLANT—the Simon-Carves, Limited, Otto—said to be the first of its kind in the UK, which converts butane into household gas, was opened in Guernsey on Friday last.

Board Changes

Managing Director of British Crane

APPOINTED managing director of the recently formed BRITISH CRANE COMPANY, LIMITED, is Mr. R. Cooke. The company is part of the export organization of the Steel group of crane and excavator manufacturing companies.

MR. R. COOKE

After six years as a lieutenant in the Royal Navy, Mr. Cooke joined R. H. Neal & Company, Limited, as an assistant in the oversea sales department. He held a number of other appointments before becoming general sales manager. He was co-opted on to the board as sales director in 1957, a position he held when R. H. Neal became a member of the Steel Group. In addition to his present appointment, Mr. Cooke has also joined the boards of Steels Engineering Products, Limited, and F. Taylor & Sons (Machinery), Limited, the other two firms in the Crane group.

BURTONWOOD ENGINEERING COMPANY, LIMITED—Mr. H. V. Rowlands has been appointed sales director.

CONSOLIDATED TIN SMELTERS, LIMITED—Mr. E. A. E. Schicht has been appointed to the board in place of Mr. A. M. A. Wijnans who has retired.

BAILEY METERS & CONTROLS, LIMITED—Mr. W. T. Flower has been appointed deputy managing director of the company, a subsidiary of Babcock & Wilcox, Limited.

BRITISH METAL CORPORATION, LIMITED—Mr. C. C. P. Tennant has been appointed a director of the company, a subsidiary of the Amalgamated Metal Corporation, Limited.

GEORGE COHEN SONS & COMPANY, LIMITED—Mr. Alan S. Gill has retired from the board on reaching the age of 65. He is to practise as an industrial consultant.

LAURENCE, SCOTT & ELECTROMOTORS, LIMITED—Mr. Claud Laurence has resigned from the board after 37 years' service. His son, Mr. J. A. Laurence, succeeds him.

DANIEL ADAMSON & COMPANY, LIMITED—Mr. S. Shenton, secretary, and Mr. G. H. Mutch, have been elected directors and Dr. A. R. Morcom has resigned from the board.

CLYDE ALLOY STEEL COMPANY, LIMITED—Mr. Q. C. McMillan, Mr. J. A. H. A. Nicol, Mr. A. Pearson, and Mr. T. T. Shepherd have been made directors of the company, a subsidiary of Colvilles, Limited.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED—Dr. J. M. Holm, joint managing director of the Nobel division, has been appointed to succeed Dr. James Craik as chairman of the division when the latter retires on March 31, 1961.

CROMPTON PARKINSON, LIMITED—A number of appointments have been made to the boards of the subsidiary manufacturing companies. Mr. A. S. Duncan, general manager at the Newport works, has joined the board of Young Accumulator Company, Limited, and Mr. A. E. Gregg, general manager at the Chelmsford works, has joined that of Crompton Parkinson (Chelmsford), Limited. Mr. J. C. Mansfield and Mr. D. Ebben, assistant general managers, respectively, for motor production and lamp production at the Guiseley works have been appointed directors of F. & A. Parkinson, Limited. Mr. K. Younger, general sales manager of Crompton Parkinson, heavy plant and transmission division, has joined the boards of Crompton Parkinson (Chelmsford), the British Transformer Company, Limited, and Coke & Ferguson, Limited. Mr. C. J. W. Scott, general sales manager of Crompton Parkinson, industrial motors and lighting division, has been made a director of F. & A. Parkinson and Crompton Parkinson (Doncaster), Limited.

Ore Chartering

VERY little tonnage has been taken up to load ore from the Mediterranean area and this section of the market is quiet with no particular demand for large carriers for continental discharge. Although a 725-tonner has been fixed from Vasteras to Newcastle with magnetite for the middle of October at 38s. f.i.o. and a similar size for October-November at 47s. f.i.o. on the basis of Goole and Dover, this is the only movement on the open market from the usual Swedish ore ports to this side. On the other hand, there is some inquiry for tonnage to load ore and burnt ore from North Spain and for burnt ore Bilbao-Rotterdam paid 20s. for 4,200 tons loading and 6,000 tons from Pasajes to Bremen, same position, at 19s. 6d. f.i.o.

There has been a resumption in chartering from Vitoria to Poland, 9,500 tons for October being fixed at 49s., about 11,000 tons for late October-early November at 48s. 3d., and a similar rate for about 10,000 tons for November 1-20. Rio de Janeiro-Poland reports 49s. for 12,000 tons for October 20-November 10.

Morphou Bay pyrites to Holland secured 9,500 tons for October loading at 25s. and the same rate has been accepted for 8,500 tons for the end of October, but with Vassiliko Bay loading. Huelva/Swansea fixed 3,400 tons for October 10-25 at 36s. and 3,600 tons to Rouen at 31s., also for October. There is a moderate interest for tonnage to load phosphate and Cassablanca-Billingham recently paid 35s. for 5,800 tons, October 5-15.

RISE IN WORLD NICKEL PRODUCTION

ANOTHER 75,000,000 lb. of nickel will be added to world capacity when the new nickel mining and processing plant of the International Nickel Company of Canada, Limited, at Thompson, Manitoba, begins production in the first quarter of 1961. In 1959 world consumption of the metal was 435,000,000 lb. and this year it is expected to touch 500,000,000 lb.

Inco's annual output is expected to rise from 317,000,000 lb. in 1959 to about 350,000,000 lb. by the end of the year. Of this, 30 per cent. is used for stainless steel, 16 per cent. for high nickel alloys and 15 per cent. for electro-plating. Announcing this in London on Monday, Mr. J. R. Gordon, president, said that recent releases from stock had removed a "sword of Damocles" which had been hanging over the market.

IRON AND STEEL TRADE

OUTPUT of steel ingots and castings, which for September was at the average weekly rate of 481,000 tons, is making a big demand on the industry's essential raw materials. Pig-iron production reflects unusually high imports of foreign ore and there is no sign of any relaxation in the pressure on scrap merchants for maximum deliveries of steelmaking scrap. There is some speculation about the future—whether the increased cost of fuel will lead to a change in the price levels for steel and what the effect will be of the present difficulties being experienced by motor-car manufacturers and makers of household durables. However, as yet, any recessive tendencies have not affected the overall level of trade.

Pig-iron

The engineering foundries catering for the motor-car industry maintain reasonably good order-books enabling them to obtain fairly substantial outputs, but some reduction in the tonnage of castings must be expected. In spite of busier conditions in the machine-tool industry, furnaces producing the required grades of low phosphorus irons and hematite are able to cope with the demand from the foundries quite easily.

There is capacity to spare at the light foundries and no difficulty is experienced in obtaining the required supplies of high phosphorus pig-iron.

Ferro-alloys

There has been a further reduction in the price of ferro-tungsten this week, the current price now being 11s. 6d. per lb. W contained. Tungsten metal powder is now 14s. 6d. per lb. Little change is noted in the call on ferro-tungsten, most other items remaining in good demand.

Interest in ferro-niobium is maintained, and ferro-titanium is fairly active. Steady attention is given to ferro-molybdenum, and there is a reasonable call on ferro-vanadium.

Semi-finished Steel

The re-rollers continue well occupied, substantial outputs being obtained for all their products. Good demands are being made for small bars and light sections and the heavy call for reinforcing rods is sustained. Shortage of labour still acts as a deterrent to increased outputs.

Most of the re-rollers have good supplies of mild steel billets, etc., in stock, but there is still some difficulty in maintaining a steady and sufficient delivery of the higher carbon and alloy steels.

Finished Steel

The slight decline in demand has had little or no effect on the general situation as, with full order-books for several months ahead, makers are not too keen to undertake further commitments. Any impact the "recession" may have is therefore likely to be of the nature of "delayed action." There is no sign of lessening in demand for plates, particularly the medium and thinner grades, and the rolling dates for some of the heavier types now show a tendency to lengthen.

The pressure on makers of cold reduced sheet has eased slightly, but, even so, existing commitments will keep them occupied until well into the New Year. It is still possible to get reasonable delivery dates for black sheet and hot rolled strip, but galvanized sheet, both plain and corrugated, maintains a brisk demand.

SCOW's Improved Output Figures

DUE to the completion of the larger units of its third development plan, the Steel Company of Wales, Limited, is able to report considerably advanced production figures for the 52 weeks ended October 1, 1960, compared with the 53 weeks of the year to October 1, 1959. The full benefits of the development have not yet been experienced for a complete year.

Output figures for 1960, with comparable 1959 figures in parentheses are as follow:—Coke, 1,494,000 (1,082,000) tons; pig-iron, 1,918,000 (1,365,000) tons; steel ingots, 2,777,000 (2,324,000) tons; sheets, 1,113,000 (912,000) tons; plates, 194,000 (206,000) tons; tinplate, 891,000 (802,000) tons.

PLATE LEVELLERS FOR THE STEEL INDUSTRY

FOLLOWING a contract for five heavy plate roller levellers for the new plate mills at South Durham Steel & Iron Company, Limited, and the Consett Iron Company, Limited, the Head Wrightson Machine Company, Limited, a subsidiary of Head, Wrightson & Company, Limited, has received an order from Colvilles, Limited, for an 11-roll backed up roller leveller for dealing with hot steel plates up to 1 in. thick by 10 ft. 6 in. wide.

Additionally a further order has been received from the Consett Iron Company for a second 9-roll backed up leveller capable of handling hot plates up to 1½ in. thick by 10 ft. 6 in. wide. The total value for contracts received recently for plate levellers for the steel industry amounts to about £550,000.

Call-up Threatened 60 Jobs

THREATENED close-down of Frank Salt & Company, Limited, manufacturers of foundry plant, of Birmingham, with the resultant redundancy of its 60 employees has been averted by Birmingham Military Service Hardship Committee. Mr. James Paul Ward (22) has controlled the family business since his father was involved in an accident and as he was unable to find anyone to look after his interests when he was called-up he had no alternative but to dispose of the business and dismiss his employees, some with many years' service.

The hardship committee, however, postponed his national service until February to ensure the company's survival.

NACM President for Lancashire

MR. G. W. SANDERS, who is this year's president of the Lancashire branch of the National Association of Colliery Managers, is production manager of the No. 3 (St. Helens) Area, North-Western Divisional Coal Board. A member of the council of the Lancashire branch of the NACM for several years, he is also senior vice-president of the Manchester Geological and Mining Society.

MR. G. W. SANDERS

Mr. Sanders trained early as a mechanical engineer, but the pull of family associations led him to mining while still a young man. After taking his first class colliery manager's certificate, he joined Sneyd Collieries, Limited, and was successively overman, undermanager, assistant manager, and manager of that colliery. During that time he became a council member of the North Staffordshire branch of the NACM. In 1950 he was appointed assistant Area general manager for the St. Helens Area, North-Western Division, rising by 1958 to Area production manager.

Long interested in the study of management, he is a member of the British Institute of Management, and is a council member of the Merseyside branch of that body. He has lectured on management for the institute, and is a visiting lecturer to the Wigan & District Mining and Technical College.

Taking "The Burden of Management" as the theme of his presidential address, Mr. Sanders warned that Lancashire could face a crisis unless more large coal was forthcoming from the pits. The issue, he said, was a vital one. Output must be increased and, he added, "What the public reaction will be if large coal is not produced this winter hardly bears thinking about."

Dorman Long Solves Preservation Problem

PROBLEM of preserving from corrosion 6,000 tons of high tensile steel in storage for the suspension cables on the Firth of Forth bridge has been solved by Dorman Long & Company, Limited, by stacking the wire coils inside sealed polythene bags from which the moisture is extracted by Westair de-humidifying units.

The wire, worth about £600,000, had to be made and built up in storage over a period of 14 months before being shipped to the bridge and protected during that time from deterioration.

PLANNING PERMISSION has been given for a lime burning plant to be built by Colvilles, Limited, at its Ravenscraig steelworks, Motherwell, as a cost of £500,000.

Minister Visits New and Old Yorkshire Pits

ALTHOUGH the Government knew that in allowing the National Coal Board to increase the price of coal it would mean a secondary wave of price increases in other industries, it felt that this was preferable to a direct subsidy to the coal industry—the only alternative. Mr. Richard Wood, Minister of Power, said this at the end of his visit to Kellingley and West Riding collieries in Yorkshire on Monday.

"We felt that to allow the Coal Board to put up its prices was the only answer," he said. "In our discussions on the matter the fact that there would be a round of price increases in other industries was acknowledged and given full consideration." On leaving Kellingley Colliery the Minister's comment was: "This is a good answer to anybody who says that coal has not got a future." It would produce a lot of coal efficiently and cheaply.

Mr. Wood went first to Kellingley—the £10,000,000 all-electric colliery which is being sunk near Knottingley—and at 617 ft. down saw the freezing process which enables the shaft to be sunk through water-bearing strata. At the West Riding Colliery—the oldest pit in the North-Eastern Division of the NCB, Mr. Wood went down to the 149 ft.-deep Warren House Seam and also inspected the two steam-driven winding engines which were installed in 1862 and which are still working well.

He was accompanied on his visit by Mr. W. H. Sales, divisional chairman, and Mr. Dean Harrison, general manager of the Castleford Area of the division.

New Central Workshops Opened in Durham Coalfield

NEW central workshops for the No. 1 (North-east Durham) Area of the Durham Divisional Coal Board were opened at Whitburn last Friday by Dr. W. Reid, chairman of the divisional board. Serving the 12 collieries in No. 1 Area, the new workshops, which include administrative headquarters, are the second new major central workshops to be built in the Durham coalfield. The other is at Tursdale.

Facilities are available at Whitburn for the maintenance and repair of all surface and underground machinery, and workshop sections are laid out in accordance with current work flow principles, with trades grouped to reduce noise from one section of the shop to another. The new workshop system will provide for colliery plant being held on a "pool" basis, allowing a freer movement of plant and ensuring that all spare equipment is kept repaired and ready for immediate use.

IMPROVED holiday policy for salaried and weekly wage employees is to be introduced by the Goodyear Tyre & Rubber Company (Great Britain), Limited, with effect from next January. Employees with six months' continuous service will receive one week's holiday, those with one year's service, two weeks, and those with two years' service, three weeks. After 15 years employees will get an extra three days and those who have been with the company for 25 years will get four weeks' holiday.

Law Cases

MINES AND QUARRIES ACT

Appeal "of Greatest Importance" Dismissed

APPEAL which counsel said was "of the very greatest importance" to miners and the mining industry has been dismissed with costs in the Appeal Court. Mr. Frank Hall Brown, 39-year-old pit electrician at Crofton Hill Colliery Blyth (Northumberland), appealed from the rejection of his claim against the National Coal Board for damages for personal injuries received when struck by falling rock. The claim was dismissed by Mr. Justice Thesiger at Durham Assizes a year ago.

Giving judgment, Lord Morris of Borth-y-Gest, who sat with Lord Justice Pearce and Mr. Justice Pilcher, said that counsel for Mr. Brown had submitted that the NCB, or the colliery manager, was in breach of an absolute duty imposed by Section 48 of the Mines and Quarries Act, 1954, to keep the mine's roads and working places secure. Lord Morris could not agree that the section meant that the manager must "ensure" that such places were kept secure. What was said was that the manager must take such steps as were necessary to keep the roads or working places secure.

Mr. Brown was injured after a tub had come off the rails and displaced a roof support. There was no evidence that down to the moment when the support was displaced the manager had failed to take the necessary steps to keep the roads and working places secure. Insecurity caused by the displacement was being dealt with with the utmost dispatch at the time of the accident.

There was no evidence of any failure on the part of the manager between the moment of the support's displacement and the accident and the appeal should be dismissed. Lord Justice Pearce and Mr. Justice Pilcher agreed.

Mr. Brown was granted leave to appeal to the House of Lords.

THEFT THREATENED PIT SAFETY

THEFT of brass and copper fittings, valued at £75, from Markham Main Colliery (Yorks) endangered the safety of the mine and the lives of the 2,000 men employed there, claimed Mr. A. Wharam, prosecuting in a case at West Riding Quarter Sessions.

Harold Tolson (19) was fined £10 for stealing the fittings from various underground electrical, mechanical, and fire-fighting equipment and appliances at the colliery.

FORMER Bathgate (West Lothian) miner, Mr. Francis Cochrane, was awarded £6,200 damages against the National Coal Board by a jury sitting with Lord Walker in the Court of Session. He sustained a fractured thigh and facial injuries in an accident at Easton Colliery, Bathgate. He sued the NCB for £10,000.

ACCIDENTS DO HAPPEN, said Judge O. Temple-Morris at Newport County Court, but there is not always anyone to blame. He was dismissing a claim by William Allen (24), a steelworker, who had claimed damages from his employers, the Whitehead Iron & Steel Company, Limited, following an accident to his hand at work.

MINER who sued the National Coal Board for £75 after his hand had been injured in a fall at the coal face at Jenny Gray Colliery (Fife) had his case dismissed at Dunfermline Sheriff Court. Sheriff R. R. Kydd said that the pursuer's case should have contained specific averments to the appearance of the coal face from which the fall occurred, and the fact that reasonable inspection would have revealed its dangerous condition.

Call to Arms for the Coal Industry

"I AM the boy to lead the army in the fuel war, because I am determined to have no more Jeremiahs talking to me about contracting the industry," declared Mr. Alfred Robens, chairman-designate of the National Coal Board, on Saturday. His audience at the Coal Utilization Council, Newcastle-upon-Tyne, then heard the Board's plan of attack.

MR. ALFRED ROBENS

This year it would sell as near 200,000,000 tons as made no matter. "There is to be no further contracting of the industry if I can help it," Mr. Robens said. "To maintain the industry at 200,000,000 tons a year means doing that by our own efforts, which means an intensive all-out sales effort to sell coal against oil competition—and this we intend to do." He was perfectly satisfied that they could get costs to a point where they could compete with oil quite easily.

By 1975, Mr. Robens said, power stations could be taking over 100,000,000 tons of coal a year if they continued to burn coal, and if power stations were built on the coalfield then their customers were on the doorstep. "I cannot wait for the day to come for a fuel and power policy to be provided which says that this is the part coal is going to play," he said.

Coalfield News

Output Increased at Condemned Pit

CHANGE in production methods, which will increase output, was started on Wednesday at Northfield Colliery (Lanarkshire). The pit is due to be closed next year as uneconomic. The undercut has been reduced from 4½ ft. to 3½ ft., which will mean a shallower "bite" into the face line during cutting and will ensure that the coal is taken out every day.

Mr. William Moore, branch delegate of the NUM, said: "We have been advocating a smaller undercut for about a year. This new method will increase production and also extend the life of the field of coal being worked. Previously the coal in this section was taken out only two or three times a week."

THE ADJOURNED INQUEST on the victims of the Six Bells Colliery explosion will now be held on November 23. The fund set up for dependants now totals over £92,000.

UNITED THANKSGIVING SERVICE to mark the safe deliverance of the seven miners trapped for 18 hours last week at Hickleton Main Colliery was held at the colliery welfare on Sunday.

TO MARK HIS SUCCESS in winning two silver medals for archery in the Olympic Games for paraplegics in Rome, Mr. Cliff Bradley was presented with a gold watch at Clay Cross (Derbyshire) on Saturday.

DURING AUGUST, 94,968 tons of coal were shipped from the River Wear. Due to the seamen's strike this was the lowest monthly figure in recent months and 48,361 tons below the figure for August, 1959.

ALLEGATIONS by two miners' officials that the election of the Lancashire secretary of the National Union of Mineworkers was "rigged" are to be investigated by the Lancashire executives of the NUM.

NOTTINGHAMSHIRE AREA council of the NUM is to ask the NCB for an investigation into a new "shell" of explosives used in shotfiring. It was alleged that "deadly" gases are released when the shell is used.

AFTER 50 years in the mines, Mr. Samuel Smith has retired from Ellington Colliery (Northumberland) where he has been for 33 years. His son, Mr. T. L. Smith, is manager of Woodhorn Colliery (Northumberland).

TOTAL OUTPUT so far this year in the West Midlands Divisional Coal Board, at 10,674,000 tons is just under 11 per cent. down on the corresponding period of 1959. Manpower in the division on October 1 was 43,544, a reduction of 7,625 on last year.

THE 12TH annual shotfiring competition organized by the West Fife Area of the Scottish Divisional Coal Board staged at Kirkford No. 10 Colliery, Cowdenbeath, was won by Mr. Daniel Barr, of Nellie Colliery. Runners up were Mr. Hugh McFarlane, Dundonald Colliery, and Mr. James McCafferty, Blairhall Colliery.

RULE made in 1954 by the Durham Area Miners' Council preventing any speaker from appearing more than once in five years at the Durham Miners' Gala is to be scrapped. The council is to revert to the old practice of electing speakers because, said Mr. Sam Watson, president of the Durham NUM, the general feeling was that the standard of gala speeches had fallen.

THOUGH Carlton Main Frickley Colliery band came in second on Saturday in the Daily Herald's national brass band national championship, it scored 194 points, only two behind the winners, Munn & Felton's "Footwear," of Northamptonshire. Fourth with 190 points was the Ransome & Marles Works' band. Cammell Laird Works' band was second in the third section and Rossington Main Colliery was third in the fourth section.

VERDICT OF ACCIDENTAL DEATH was recorded on Mr. Keith Thomas Jones (23), who died following an accident at Rose Heyworth Colliery, Abertillery, where his father was killed a week or two previously. At the inquest on Thursday of last week, Monmouthshire deputy coroner, Mr. D. J. Treasure, said it would remain a mystery how Mr. Jones came to be where he was when a fall of roof followed shotfiring. The deputy, Mr. W. T. Brown, who had fired the shot had taken every precaution.

Importance of Engineers in Mining

GROWING importance of the electrical and mechanical engineer in mining was stressed by Mr. A. E. Crook, chief engineer (production), National Coal Board, speaking in Glasgow on Saturday at the annual dinner of the West of Scotland branch of the Association of Mining Electrical and Mechanical Engineers. Mr. Crook is president of the association.

MR. A. E. CROOK

Attributing the considerable reduction in mining accidents to the increasing use of mechanical and electrical power, Mr. Crook said that there had been a four-fold increase in mechanical and electrical power used in mines since 1910: in 1909 there were 2,500 serious accidents, compared with 900 last year. The association had contributed to this increase in safety by the standards set in its examinations.

In future the mining industry would continue to demand better use of mechanization in its fight to repel the "foreign oil invasion" and electrical and mechanical engineers and their association would grow in importance. They were, however, very disturbed by the inadequate status of these men in the industry—a status too much akin to that of Cinderella. He felt it should be reviewed forthwith.

Mr. Crook was replying to the toast of the Association proposed by Prof. George Hibberd, Professor of Mining at the Royal College of Science and Technology, Glasgow. Prof. Hibberd said that in 1910 there was only 1 h.p. of machinery available for each individual in the mines. The ratio had increased until 1958 when was 6.61 h.p. Over the past three years there had been a reduction of manpower in the mines, but he thought that the industry would for many years remain a mainstay of British economy.

Other speakers were Mr. J. Cowan, HM Principal Electrical Inspector of Mines, Mr. B. E. Shaw, vice-president of the branch, and Mr. R. W. Wait, former branch president.

THE COAL TRADE

WHATEVER the fuel situation elsewhere, the industrial market remains remarkably steady, the principal problem to be overcome being that of adequate transport facilities. This is leading to some delay in deliveries, but generally manufacturers' requirements are being met. The steady and strong demand for hard coke in the blast-furnace qualities indicates the liveliness of industry and, although there is some disquiet as to the future of the motor-car industry, foundrymen continue to maintain a high level of demand for prime foundry coke.

DURHAM AND NORTHUMBERLAND

The general position has a stability about it which, for better class descriptions, could harden into firmness if winter demand was above normal because of severe weather. Superior classes of large steams and graded sizes have now a comfortable order-book over the next six months.

Modernization and closure of exhausted collieries are also bringing stability of output, closures being compensated by rising production per manshift at the coalface. The balance now attained between supply and demand, so far as better class fuels are concerned, does not, however, offer much margin in supply. Power stations are taking larger quantities of lower grade steams and stocks in this area have been somewhat reduced.

Durham gas coal moves off in rather better quantities and Durham coking coal and Durham industrial cokes have a sustained demand from an iron and steel industry working to capacity. Industrial requirements generally are about average. Domestic cokes show more seasonal movement and there is fair activity in the export section in which cokes maintain a very useful share.

NORTH WALES

Demand for house coal continues to be keen, and merchants are having an unenviable time satisfying householders' requirements. Very little additional coal is on offer, and what little there is available is quickly absorbed.

The same shortage persists in receipts of all grades of anthracite, and order lists are heavy, consumers expecting delivery before the winter increase comes into operation. "Phurnacite" is now also subject to several weeks' delay, and other smokeless fuels such as "Coalite" are also in arrear.

The one bright spot is coke, the usual seasonal increase in demand being very pronounced. Consumers' requirements are immediately satisfied, from the plentiful stocks of all grades. The requirements of industry are catered for satisfactorily.

WEST MIDLANDS

Demand for house coal continues at an extremely high level and it is generally expected that there will be no easement before the arrival of winter prices on November 1. Merchants' stocks have been seriously depleted in an effort to meet the demand, and at the same time the NCB has augmented despatches by the lifting of ground stocks. Although householders are asking for large coal and cobbles, house nuts are exceptionally active for the time of the year.

A strong market has developed in respect of all fuels in connection with the domestic boiler trade. Anthracite stove nuts and beans are very scarce and merchants' orders are several weeks in arrear. Dry steam nuts are almost as difficult and special-purpose central heating fuels cannot be so promptly supplied as hitherto. Most merchants are fully extended in coping with a rush of orders for domestic coke.

No special difficulty exists in meeting the present-day demand for industrial coals as supplies are fairly satisfactory. Delay in loading of contractors' vehicles at the pits is sometimes a cause of irritation, but, broadly speaking, manufacturers' requirements are being met and consumers' stocks are reasonably good.

The market for hard coke is strong, particularly in respect of blast-furnace qualities. The demand for general engineering qualities has grown and the position is moderately satisfactory. Stocks at coke ovens are considerable, especially of sized coke. On the whole the demand for prime foundry coke is strong, but buyers are being supplied with their requirements.

Coal and the Atom will Electrify the 1970s

THE National Coal Board has told the Central Electricity Generating Board that it could supply 80,000,000 tons of coal a year by 1970. By 1975 the CEGB will require total quantities of fuel equivalent to 115,000,000 tons of coal a year. Revealing this on Thursday of last week, Sir Christopher Hinton, chairman of the CEGB, told a trades union meeting on Radiations in Industry, in London, that it was doubtful whether indigenous coal could be relied on to meet this requirement.

He went on to say that by 1970-71 it could be expected that nuclear power would be generating electricity equivalent to that produced by 17,500,000 tons of coal as compared with a coal usage for power production of 65,900,000 tons. By this date, subsidiary fuels such as oil could be expected to be used by comparison at a rate of only 5,400,000 tons of coal equivalent a year—or 2,500,000 tons less than in 1965-66.

There was every reason to believe, he said, that the downward trend on the capital cost of nuclear power stations would continue. There was no urgent case for building nuclear power stations on the grounds that they would immediately give cheaper power than conventional power or that in the next decade conventional fuels would be insufficient. It was a national necessity however, Sir Christopher said, that we should have a nuclear industry able to meet the demand for such power when it became cheaper than conventional power. For base load operation that would be by the early 1970s and the break-even date between nuclear and conventional power should fall between 1966 and 1970.

Is Industry Being Misdirected?

CONCERN at the attitude in Government circles about taxation and criticism of the official policy in directing industry to areas of unemployment were expressed by Mr. S. P. Chambers, chairman of Imperial Chemical Industries, Limited, addressing the West of England branch of the Institute of Directors last Friday.

MR. S. P. CHAMBERS

To the simple-minded, he said, if an area had such unemployment the remedy was to drive industry to set up factories there. But all the evidence indicated that this was not the way to deal with the problem and that it could do much damage to the nation's industry. "If there are no sound opportunities of employment in some areas, the cure is for the people in those areas to move to where there are opportunities. If, however, the loyalty to and attraction of the areas are such that people prefer to stay there they must expect the lower material standards of living which the lower productivity of the areas dictates. They are not entitled to insist that by misdirection of industry the average standards of industry as a whole be brought down," he said.

Speaking of taxation Mr. Chambers said that a simplification not only of the tax laws and administration but of controls that the Government saw fit to impose upon industry were long overdue. The cost of collecting direct taxes alone, leaving out the cost of collecting customs, excise, and purchase tax, was now £46,000,000. When one considered the drive that had been made to get away from the desperate war-time levels of taxation and the proposals for simplification which had been made, this figure could only be regarded as representing a failure to tackle one of the country's major problems—the steady growth of the number of people engaged on rather sterile duties of this kind.

He would cut down certain Government departments quite ruthlessly—not by having insufficient people to do the work Parliament imposed on them but by cutting many of the tasks which they were asked to do.

Exports of Shipbreakers' Scrap

IN consultation with the Ministry of Power, the Board of Trade announces that it is prepared to consider applications for licences to export ferrous and non-ferrous scrap arising from ships of 100 gross tons or over to be broken up in the UK.

Further details are obtainable from the Ministry of Power, Iron and Steel Division, Room 1464, Thames House South, Millbank, London, S.W.1.

AFTER 51 YEARS at Broomhill Colliery (Northumberland) Mr. James Wilson is to retire. He started with Broomhill Collieries, Limited, as an office boy.

Problem of the Double Day Shift

IF labour was unwilling to work a double day shift, machines would have to be worked on a single shift of ever-shortening duration which would make costs intolerable. This problem was stressed by Lord Aberconway, chairman of John Brown & Company, Limited, speaking at the annual dinner of the Sheffield section of the Institution of Production Engineers on Monday of last week.

Other countries had tackled the problem and double day shift working was accepted. The problem here, he felt, was more social than technical, but it touched very closely on the work of production engineers. "I feel that this is a problem to be tackled and solved if we are to remain a manufacturing nation," he declared.

The key role of production engineers was to increase productivity to an extent that higher wages and other increasing costs did not restrict Britain in world markets.

Committee for Commonwealth Conference Established

COMMITTEE is to be set up to recommend participants in the Duke of Edinburgh's second Commonwealth Study Conference in Canada next year. The aim of the conference is to consider the human consequences of the industrialization of the member countries of the Commonwealth.

Sir Alexander Fleck, FRS, president of the Society of Chemical Industry, and former chairman of Imperial Chemical Industries, Limited, is to act as chairman of the committee. He was chairman of the membership committee of the first conference held at Oxford in 1956. Other members include Sir Harold Hartley, FRS, scientific adviser to Constructors John Brown, Limited, Sir Miles Thomas, chairman of Monsanto Chemicals, Limited, and Sir Reginald Verdon Smith, chairman of the Bristol Aeroplane Company, Limited.

New Directors of Samuel Osborn Group

NUMBER of new appointments have been made to the board of Samuel Osborn & Company, Limited, manufacturers of high-speed steel and tool steels, etc., of Sheffield, and to the boards of its subsidiary companies. Mr. A. Hutchinson, Mr. R. F. Horton, and Mr. I. G. Buchan have joined the parent board, while Mr. J. Williams and Mr. V. P. Giles become local directors. Mr. F. May has been elected chairman of the subsidiary board.

Mr. R. Thompson has joined the board of Burys & Company, Limited, and Mr. A. C. Dennis that of Osborn Foundry & Engineering Company, Limited. Mr. F. A. Kirk has become a director of the Titanic Steel Company, Limited.

PLANNED REORGANIZATION on a regional basis of the sales of Winston Electronics, Limited, Shepperton (Middx), is furthered by the appointment of Hawnt & Company, Limited, Birmingham, as its Midland distributors.

COMPANY NEWS

LAPORTE INDUSTRIES, LIMITED—The interim dividend of 3 per cent. is maintained on a capital increased to £11,822,760 (£8,757,600).

WOLSELEY-HUGHES, LIMITED—Final dividend of 10 per cent. makes 12½ (10) per cent. for the year ended July 31, 1960. Net profits rose to £128,636 (£88,142), after tax.

LAYCOCK ENGINEERING, LIMITED—The formal increased offer for the preference and ordinary capital of Hardypick, Limited, has now been sent to holders. The Hardypick directors now recommend the offer.

BRITISH OXYGEN CANADA, LIMITED—The company, a wholly-owned subsidiary of the British Oxygen Company, Limited, has bought the business of Advance Welding Supply Company, Limited, Sarnia, Ontario.

GRIMSLEY & COMPANY (LEICESTER), LIMITED, specialists in machinery for the hosiery industry—The company has been acquired by Isaac Braithwaite & Son (Engineers), Limited, laundry machine manufacturers, of Kendal.

WILLIAMS & WILLIAMS, LIMITED—It is proposed to alter the articles of the company to bring them more into line with modern practice. An extra-ordinary meeting will be held on November 8 at the Waldorf Hotel, London, W.C.2, for that purpose.

CONSOLIDATED TIN SMELTERS, LIMITED—The entire share capitals of Kirkdale Haulage Company and William Lewis, two private companies operating a fleet of long- and short-distance haulage vehicles from Liverpool, have been bought for £305,000.

MINWORTH METALS, LIMITED—Dividend for the year ended July 31, 1960, is maintained at 30 per cent. on capital increased by a one-for-two scrip issue, making an effective rise of 10 per cent. in the payment. Group profits rose sharply from £124,347 to £179,770.

TILLEY LAMP COMPANY, LIMITED—As for the previous year, no dividend is to be paid on the ordinary shares for the year ended March 31, 1960. The same applies to the preference shares, which are now in arrears from October 1, 1958. Net loss was £105,971 (£51,505).

COCHRAN & COMPANY ANNAN, LIMITED, engineers and boilermakers—Final dividend of 6 per cent., against a 5 per cent. minimum forecast, makes 8 (9) per cent. for the year ended June 30, 1960. Net profit fell from £94,108 to £72,443, after tax of £72,283 (£104,985).

C. H. JOHNSON (MACHINERY), LIMITED—The entire business and premises of the Compressor & Demolition Company, Limited, London, S.W.8, have been acquired. Mr. J. S. Mandel is retaining his position as director and manager, and Mr. C. Mandel is remaining in charge of the offices.

BRITISH ALUMINIUM COMPANY, LIMITED—A final dividend of 8 per cent. makes 12 per cent. for the year to July 31, 1960, compared with the single 5 per cent. of the previous seven months' period. Consolidated trading profits (excluding Canadian British Aluminium) amounted to £5,133,651 (£2,004,418).

OXLEY ENGINEERING COMPANY, LIMITED—Dividend of 12½ per cent. plus a capital distribution of 3 per cent., is to be paid for the year ended June 30, 1960. In the previous year a total of 16½ per cent. plus a 2½ per cent. net capital distribution was paid. Group net profit was £68,218 (£84,127), after tax of £54,778 (£61,804).

NEEPSEND STEEL & TOOL CORPORATION, LIMITED—The dividend is being maintained at 50 per cent., on capital increased by a one-for-four scrip issue, for the year to March 31, 1960, with a final of 37½ per cent., representing an effective increase in the total of 10 per cent. Group trading profits improved from £1,105,196 to £1,210,920, and the net profit is up from £604,371 to £704,246.

ASH & LACY, LIMITED, sheet manufacturers, etc., of Birmingham—Although the order-book is at present well filled the directors feel that the record turnover for the year ended June 30, 1960, may not be maintained, although they do not expect "a serious fall in profits." Group trading profit and other income amounted to £135,548 (£101,292) in 1959-60 and the dividend is 17½ per cent.

JAMES H. DENNIS & COMPANY, LIMITED—Mr. James H. Dennis, the chairman, states that, having decided last year to cease the manufacture of copper sulphate and copper smelting operations, it has now exchanged contracts for the sale of the land and buildings at Widnes. The company has continued during the year to carry on disposing of its stocks of copper sulphate and raw materials and has been dealing in metals.

TOLEDO WOODHEAD (SPRINGS), LIMITED, Sheffield—Final dividend of 12½ per cent. makes 20 (15) per cent. for the year ended August 28, 1960. Net profit rose from £45,779 to £59,125, after tax of £74,478 (£41,640). Development carried out during the past 12 months and plans for the next year require further capital of £225,000 and the directors intend to make a rights issue.

PROJECTILE & ENGINEERING COMPANY, LIMITED—An increase of 2 per cent. to 6 per cent. in the interim dividend on account of 1960 is announced. A final of 11 per cent. made a 15 per cent. total for 1959. The board states that the interim is increased in view of the healthy state of the order-book and the fact that—as forecast by the chairman last May—the current year has so far proved to be satisfactory, with profits ahead of last year.

EXPERT TOOL & CASE HARDENING COMPANY, LIMITED—At Wednesday's meeting in London, the chairman, Mr. Sidney H. Newman, said that all companies in the group were now operating at a profit and, in fact, for the nine months ended September, a small surplus was earned by the group. The cash problem, however, was still the dominant factor, but, provided that this could be contained, he could now predict that the company would make a profit for the year as a whole.

POLLARD BALL & ROLLER COMPANY, LIMITED—In addition to raising its interim ordinary dividend to 5 per cent. from the equivalent of 4 per cent., the company proposes to make a one-for-two scrip issue and also to raise about £500,000 by means of a rights issue on favourable terms to stockholders. The directors expect to recommend a final dividend of 14 per cent. for 1960 on the capital increased by the proposed issues. The 1959 final was 20 per cent. prior to an one-for-four scrip issue.

HILLS (WEST BROMWICH), LIMITED, manufacturers and engineers to the building trade—Order-books have continued to build up and at the year-end, July 31, 1960, there were sufficient orders to keep all departments busy for the rest of the year, the directors state. Competition for labour, shortage of materials, and site deferments by clients meant that although trading results for the year were better than last year, they failed to come up to expectations. The company, should, the directors add, become progressively more profitable.

Orders Placed

£100,000 Electricity Board Orders for Birtley

EXTENSIONS are to be carried out by Birtley Engineering, Limited, to the coal conveying plant at the Central Electricity Board's Blyth "B" power station in Northumberland and at West Thurrock power station, Essex. Together, the orders are worth over £100,000 to the company, which is a subsidiary of the Birmingham Small Arms Company, Limited.

The complete coal handling plant for Blyth "A" power station was supplied by Birtley Engineering and the West Thurrock contract is additional to work already being undertaken by the company at that site.

IN CONNECTION with a new berth at the Wallsend shipyard of Swan, Hunter, & Wigham Richardson, Limited, a £300,000 civil engineering contract has been awarded to Balfour, Beatty & Company, Limited.

SWITCHGEAR for three main sub-stations in Kuwait is to be supplied by South Wales Switchgear, Limited. The £156,000 contract has helped the company to reach a new export record in the first eight months of this year.

NEW BOILER HOUSE, plant, and coal firing equipment, capable of producing 80,000 lb. of superheated steam per hour, is to be supplied by Truswell & Son, Limited, Newcastle-under-Lyme (Staffs), to B.I.P. Chemicals, Limited, Oldbury (Yorks).

SUPERTANKER, Esso Portsmouth, which was seriously damaged by explosions and fire at Milford Haven in June, is to be repaired in the Palmers Hebburn yard of Vickers-Armstrongs (Shipbuilders), Limited. The contract is worth £1,000,000 and will provide work for several hundred men for some months.

MINERAL INSULATED CABLES, manufactured and supplied by British Insulated Callender's Cables, Limited, have been installed in all the power, lighting and other electrical circuits, in the four Voith Schneider propelled ferries supplied for the transport service plying between Penang and the mainland of Malaya.

IN THE FACE of international competition Lister Blackstone Marine, Limited, Dursley (Glos), has won a contract from the Chilean Ministry of Fisheries for 80 Lister-type SL2MGR and 50 Lister-type SL3MGR engines. They are to be allocated to fishermen whose craft were lost in the recent Chilean earthquake.

ELECTRICAL EQUIPMENT for 23 high-speed a.c. multiple-unit electric trains is to be supplied by the General Electric Company, Limited, to British Transport Commission. The order is worth £580,000 and is claimed to be the first placed in this country for equipment to work at a maximum service speed of 90 m.p.h.

ORDER FROM THE Central Electricity Generating Board for four 75,000-kVA 3-phase transformers for Templeborough substation has been received by Associated Electrical Industries, Limited. The transformers will step down the 275-kV supergrid voltage, providing a 33-kV supply to six 40-mVA arc-furnace transformers to be installed by the Steel, Peech & Tozer branch of the United Steel Companies, Limited, as part of its £10,000,000 scheme.

DIESEL GENERATOR SETS for the entire electric power supply to the new Mauritania (French West Africa) mines and port handling facilities are to be supplied by Mirrlees, Bickerton & Day, Limited, Stockport (Ches). The order is worth £460,000 and brings the company's order intake for the current financial year to £10,000,000—65 per cent. of which is from the export market. A total of 12 Mirrlees diesels are to be installed in two new power stations which are to be built in Mauritania.

THREE NEW contracts have recently been gained by William Boby & Company, Limited, water treatment engineers, of Rickmansworth (Herts). The English Electric Company, Limited, has placed a £25,000 order for effluent treatment plant at Hinckley Point nuclear power station and Monsanto Chemicals, Limited, is to have its existing Boby water treatment plant at Ruabon modernized and extended at a cost of £4,500. The company is also to build pressure filters and chemical closing plant at the Windygates (Fifeshire) distillery of the Distillers Company, Limited.

Two New Appointments at West Instrument

SALES and service office in Cardiff, which has just been opened by West Instrument, Limited, Brighton, is to be headed by Mr. L. G. A. Gabe. For the past six years he has been with Honeywell Controls, Limited, as manager of its Cardiff office and latterly as an executive in London.

MR. L. G. A. GABE

Prior to that, Mr. Gabe was with the Salem Engineering Company, Limited, and Guest, Keen & Nettlefolds, Limited. Educated at Haileybury and Cardiff Technical College, he is a member of the Society of Instrument Technology and a former committee member of the society's South Wales section. Mr. R. D. H. Lane has joined the London office staff of West Instrument. After taking an engineering degree at Queen Mary's College, he served an apprenticeship with the South Eastern Electricity Board and then joined the Sperry Gyroscope Company, Limited, where he became section leader engineer.

He is a member of the Engineers Guild and an associate of the Institution of Electrical Engineers.

First British Ski-Lift Opened

CHAIR-LIFT at Glen Coe—the first mountain lift in Britain—is now ready for the coming winter sports season. Although specialized parts were supplied by a firm of Austrian experts in the field, the lift is essentially a British achievement.

The wire rope which lifts skiers in individual chairs 900 ft. up the mountain over half a mile was supplied by British Ropes, Limited, Glasgow. The tubular steel structures came from John Inshaw, Limited, Baillieston, and the structural steelwork from Scottish Fabrication, Glasgow. Other contractors included John Lang & Sons, Limited, Johnstone, the Skefko Ball Bearing Company, Limited, Luton, and Watson & McLean, Limited, Glasgow.

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T2GH Auto-Loader

Air-powered Loaders and Dumpers for every underground requirement

Headroom, track gauge, car size, clean-up range ... you take all these into consideration before you buy loaders! That's why you should know about the Atlas Copco range. This includes loaders and dumpers to meet every requirement in underground work and to handle all kinds of muck—abrasive, sticky or free-running—with equal efficiency.

Auto-Loaders

T2G and T2GH auto-loaders allow one man to carry out the complete mucking operation—loading, transporting and dumping. As a result, labour costs are considerably reduced. Fitted with pneumatic tyres, these highly manœuvrable loaders put up excellent performances in both confined spaces and wide areas. Maintenance costs are lower as the rubber tyres help to reduce stress on the loaders. The T2G dumps directly into chutes or ore pockets, whilst the T2GH has a greater dumping height allowing it to discharge directly on to conveyors.

LM Loaders (rail-mounted)

Loaders in the LM series have bucket capacities ranging from 4 to 21 cubic feet and clean-up ranges from 6′ to 12′ 5″ (1.8 to 3.8 m.) without side-ploughs. The medium-sized model of this series is the LM56. Fitted with pneumatic side-swinging and quick-action controls, this machine is designed to reduce operator fatigue and increase loading capacity. In fact, with a bucket capacity of 7 cubic feet and a clean-up range of 8′ 8″ (2.7m³), it has a loading capacity in excess of any other loader of comparable size!

WRITE FOR LITERATURE—Further information about Atlas Copco loaders and dumpers is given in a series of leaflets and folders—readily available on request. Write for copies to your local Atlas Copco company or agent or to the address below.

Sales and service in ninety countries

With companies or agents in ninety countries, Atlas Copco is the world's largest organisation specialising solely in compressed air equipment. Products include stationary and portable compressors rock drills, loaders, hoists, paint-spraying equipment and air tools of every description. Wherever you are, the international Atlas Copco group offers expert advice on the selection of equipment and provides a complete after-sales service.

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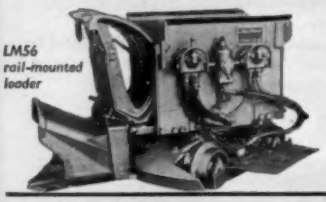
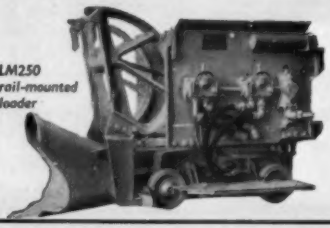


LM56 rail-mounted loader



LM250 rail-mounted loader

T2G Auto-loader

Sales and Service Depots at: LONDON · BRISTOL · CARDIFF · MANCHESTER · NEWCASTLE · WALSALL · LEEDS · GLASGOW · BELFAST · DUBLIN

D170

The Scrap Markets

Full Pressure Maintained

NOW that the steelworks and blast furnaces are working at full pressure, the demand on merchants for deliveries of maximum tonnages of the better grades of steelmaking scrap has become intense and there seems little likelihood of any relaxation in the pressure, at least for some months ahead.

Cleveland—Deliveries of destructor scrap and baled materials to the blast furnaces are impressive and the collection and processing of Nos. 1 and 2 grades of steel-melting scrap are giving the scrap yards plenty of work. Steelfoundries are also absorbing greater tonnages of short heavy steel material and the heavy machinery grades because there is now a healthier demand for castings from engineering establishments.

Calls from the ironfoundries for more cast-iron scrap come more from outside areas and a good proportion is being sent to Scunthorpe and elsewhere. Some merchants, however, do not regard existing price levels for cast-iron material sufficiently remunerative.

South Wales—Many local steelworks and ironfoundries have no stocks of iron and steel scrap on hand at all. Merchants' yards are mostly empty, but there is an extremely active market, and supplies are being delivered on a day-to-day basis in order to maintain output at its present peak level.

The shortage of heavy and better grade material remains a very real problem, but the market is active, too, in the lighter weight material. Every effort is being made to improve the flow of supplies.

Scotland—Business throughout Glasgow and the West of Scotland continues to show a good rate of turnover, the steelworks maintaining a very high demand for all available supplies. The production of steel turnings is fairly steady and, provided the material is of good quality and free from bushy turnings, it is readily accepted by the consuming works. The cast-iron borings output is also fairly constant and regular deliveries are going forward to the blast furnaces.

Business with the ironfoundries has shown signs of picking up slightly and various outlets have become available from time to time, but there is still no great demand for this grade of material. There have been some parcels changing hands and it would appear that the lighter grades of cast-iron scrap are more popular at the present time.

BIRTH OF PORTUGAL'S STEEL INDUSTRY

PORTUGAL'S steel industry, at present non-existent, is expected to become a reality next year. Already some 15,000 tons of equipment has been delivered to the site for the steelworks, some 17 miles from Lisbon. The industry is designed to save about £12,500,000 a year on steel imports.

Siderugia Nacional, the Portuguese steel corporation, has just signed a contract for the supply of 276,000 tons of manganiferous ore to be supplied by a mine in southern Portugal. The ore in this area is of high quality, but until recently annual production has only been in the region of 2,000 tons.

With this supply and poorer quality ore from northern Portugal and the 25,000-30,000 tons of scrap available annually, the corporation is to produce 200,000 tons of rolled steel a year during its first phase.

Productivity is Theme of SIMA Convention

"PRODUCTIVITY" is to be the main theme of the Scientific Instrument Manufacturers Association's ninth convention which is to be held at Eastbourne from November 17 to 20. Four panels of speakers will deal with design, management, floor production, and sales, respectively. The convention will be opened by the president, Mr. G. C. Ottway.

Among the speakers on the four panels will be Mr. A. H. Willoughby, technical manager of the Osram Lamp division of the General Electric Company, Limited, Mr. C. H. Starr, chief engineer, central engineering services, Associated Electrical Industries, Limited, Mr. D. S. A. Jessop, Management Selection, Limited, Mr. E. L. G. Robbins, managing director of Industrial Administration, Limited, Mr. J. D. Gould, Urwick Orr & Partners, Limited, Mr. S. R. Wilkins, Avo, Limited, Mr. P. Jardine, group financial controller of Metal Industries, Limited, Mr. R. Morris, director of Harold Whitehead & Partners, Limited, Mr. R. H. S. Lesser, technical efficiency and organization department, Philips Electrical Industries, Limited, Mr. D. A. Pitman, Electronic Instruments, Limited, Mr. R. J. Finlayson, operational research manager of Hawker Siddeley Industries, Limited, Mr. R. T. Harrison, IBM (UK), Limited, and Mr. F. S. Davis, chief of staff recruitment of Marconi Wireless Telegraph Company, Limited.

Triplex Foundry Pays £82,500 for Eclipse Foundry

PURCHASE price paid by Triplex Foundry, Limited, for all the share capital of the Eclipse Foundry & Engineering Company (Dudley), Limited, and its subsidiary, Eclipse Metal Industries, Limited, was £82,500. Cash payment totalled £52,500 and the balance was provided by the issue of 50,000 5s. ordinary Triplex Foundry shares at an issue price of 12s.

It is proposed to change the company's name to Triplex Foundries' Group, Limited, and at the same time arrangements are being made for the name Triplex Foundry to be protected by forming a new subsidiary to adopt that title.

Tube Mill Workers Face Redundancy

UNLESS new orders are received soon, about 1,000 men employed in the No. 2 tube mill and the Mossend (Lanarkshire) works of Stewarts and Lloyds, Limited, will lose their jobs. Work is at present being allocated on a day-to-day basis and a four-day week has been introduced at the No. 1 mill.

The No. 2 mill produces pipes for export to oilfields and while the oil industry remains slack there is little hope of more business.

"WHO IS PRESSED STEEL?" a handy guide specially prepared by the Pressed Steel Company, Limited, Cowley, Oxford, for the use of Press representatives at the Motor Show, is printed in four languages.

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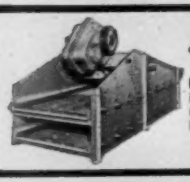
They're engineered to endure!



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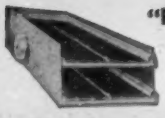
Horizontal or part inclined for installations with limited headroom.



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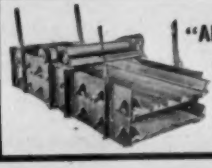
Ruggedly built inclined screen for normal or extra heavy duties.



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NEWS IN BRIEF

PLANNING APPROVAL has been received by Underground Mining Machinery, Limited, for a 20,000-sq. ft. extension to its Darlington factory.

FROM MONDAY all office departments of the tractor division of the Ford Motor Company, Limited, will be at 1, Ley Street, Ilford (Essex).

AS FROM November 1, the name of the United Wire Works (Birmingham), Limited, is to be changed to United Non-Ferrous Metals, Limited.

WITH EFFECT from October 31, the telephone number of Turner Bros. Asbestos Company, Limited, 14, Finsbury Circus, London, E.C.2, will be changed to LONdon Wall 5471.

LABORATORY EXTENSION is being built on to the existing laboratory of William Boby & Company, Limited, water treatment engineers, of Rickmansworth (Herts). It will double the existing laboratory capacity.

FOUR-DAY working week was introduced for 500 employees at the Shotts (Lanarkshire) factory of Cummings Engine Company, Limited, on Saturday. The arrangement is expected to be only temporary.

UNUSUALLY SEVERE fluctuations in tube orders have forced Stewarts and Lloyds of South Africa, Limited, to curtail production. One mill has been completely closed and others are working short time. Redundancy notices have been served on 38 white and 180 non-white workers.

AT THE annual meeting of the Tap & Die Corporation, Limited, on Thursday of last week, the chairman, Mr. D. G. N. Lloyd-Lowles, announced that the company is to donate a scholarship in mechanical engineering to Sheffield University. It is to be awarded each year for the three-year course.

STEEL tension members of the prestressed concrete sections of the new Medway Bridge will be Macalloy bars manufactured by McCalls Macalloy, Limited, Sheffield. The bridge, which is to have the largest prestressed concrete span—500 ft.—in the world, is part of the Medway Towns Motorway (M2).

IN MEMORY of the late William Beard Lake, founder of Lake & Elliot, Limited, steelfounders, of Braintree (Essex), and president of the Institute of British Foundrymen from 1939 to 1941, a trust fund has been established to be administered by the governing body of the Braintree College of Further Education.

DEAL has been made between the British Iron & Steel Company, Limited, and Shell Tankers, Limited, under which Shell Tankers is to scrap 20 ships, totalling 350,000 tons deadweight. The move is the result of the surplus of tankers which will arise when new tankers now under construction are commissioned.

FIRST PRIZES in the competition for science teaching by practising teachers in primary and secondary schools, awarded by Griffin & George, Limited, makers of scientific apparatus, of Wembley, have been won by Miss J. N. Norcliffe, Hoyland (Yorks), and Mr. F. Merry, Leigh (Lancs), in the primary and secondary groups, respectively.

THE LARGE ENGINEERING WORKS of G. R. Turner, Limited, wagon builders, of Langley Mill (Derbyshire), is up for sale at £127,000 freehold. An official of the firm states that the sale is unlikely to cause any redundancy. "We hope to sell the firm as a going concern so that our staff of 300 will not lose their jobs," he said.

STEAM LOCOMOTIVE, weighing 40 tons, has been given to Stone Cross Special School, Ulverston, by the Barrow Steel Works, Limited. The engine is about 100 years old and is in working order. A similar one has been delivered to Drumard House, Barrow, a training centre for backward children, which is to open later this year.

BRITISH RAILWAYS is demonstrating its latest transport development, the Roadrailer vehicle, at Marylebone goods depot, London, on Monday. The exhibition will then go to Birmingham (November 14), Cardiff (November 21), and Manchester (November 28). Later demonstrations will be held at Glasgow, Leeds, Sheffield, and Southampton.

BOTH SIDES of the engineering industry—the Confederation of Engineering and Shipbuilding Unions and the Engineering and Allied Employers' Federation—have been asked by the Minister of Labour, Mr. J. H. Hare, to meet to talk over industrial relations in engineering. His invitation is to be passed on to the 39 unions in the confederation for their views.

FILMS made by the Central Office of Information to publicize British industry were seen by 3,500,000 people in Germany last year at non-theatrical shows organized by clubs and other bodies. This was revealed in London on Tuesday, by Mr. Charles Hadfield, oversea controller of the COI, at a talk given to representatives of companies interested in German markets.

A CENTRAL AFRICAN shaft-sinking record has been set up by the Cementation, Limited, group's Rhodesian company. At the Mufulira West mine extension, close to the Belgian Congo border, 468 ft. was sunk and lined at the new No. 14 shaft in the last complete month of sinking. In the course of the contract, the Central African shaft-sinking record was broken four times.

SOVIET UNION is the world's leading producer of coal and iron ore, the news agency Tass said last Friday. Quoting the latest bulletin of the Central Statistical Board of the USSR, it claimed that the Soviet Union was leading Europe, and second in the world, in the output of engineering and electrical industries, the generation of electricity, and the production of pig-iron and steel.

MORE than 150 representatives of leading Midland foundries attended a film show and cocktail party, arranged by the Stanton Ironworks Company, Limited, in Birmingham on Thursday of last week. Mr. E. M. Summers, general manager (iron production), gave a short description of recent developments in Stanton's ironmaking practice and some of the main features of the new ore preparation plant, which was opened in October of last year.

CLAIMS for pay increases for about 500,000 "white collar" workers in the engineering industry were submitted by four unions to the Engineering and Allied Employers' National Federation in London on Tuesday. The proposed increases range from 7s. 6d. for young workers to £1 1s. 6d. at 21 and over. Scientific workers, in addition to a substantial wage increase, submitted a "wage for age" claim which would mean increasing the basic rate at 21 from £9 13s. to £11 and at 25 from £11 15s. 6d. to £16.

THE BIRMINGHAM OFFICE of the Export Credits Guarantee Department (the Government department insuring exporters against the risks of not being paid) is moving this weekend to new premises in Chamber of Commerce House, Harborne Road, in order that it can maintain its service to ECGD's growing number of policyholders. Over the past two years, there has been a 12 per cent. increase in the number of policyholders, and the value of policies handled has increased by 77 per cent. to £75,423,000 (£42,410,000).